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A STRUCTURAL WEIGHT ESTIMATION PROGRAM (SWEEP) FOR AIRCRAFT. VOLUME VIII - PROGRAMMER'S MANUAL

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Rockwell International Corporation

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Three computer programs were written with the objective of predicting the structural weight of aircraft through analytical methods. The first program, the structural weight estimation program (SWEEP), is a completely integrated program including routines for airloads, loads spectra, skin temperatures, material properties, flutter stiffness requirements, fatigue life, structural sizing, and for weight estimation of each of the major aircraft structural components. The program produces first-order weight estimates

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and indicates trends when parameters are varied. Fighters, bombers, and cargo aircraft can be analyzed by the program. The program operates within 100,000 octal units on the Control Data Corporation 6600 computer. Two stand-alone programs operating within 100,000 octal units were also developed to provide optional data sources for SWEEP. These include (1) the flexible airloads program to assess the effects of flexibility on lifting surface airloads, and (2) the flutter optimization program to optimize the stiffness distribution required for lifting surface flutter prevention.

The final report is composed of 11 volumes. This volume (Volume VIII) describes the program structure and operation. It provides a computer programmer with information for modifying or debugging the program. It is written to be used in conjunction with Volumes II through VII, which describe the methods and formulations, program descriptions, detail core maps, autoflow charts, and program listings.

PREFACE

This report was prepared by Rockwell International Corporation, Los Angeles Aircraft Division, Los Angeles, California, under Contract F33615-71-C-1922, No. FX2826-71-01876/C093. The work was performed for the Deputy for Development Planning, Air Force System Command, Wright-Patterson Air Force Base, Ohio, and extended from September 1971 to June 1974.

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D. Konishi - Advanced Composites
C. Hodson - Structural Dynamics

The final report was published in 11 volumes; the complete list is as follows:

Volume	
I	"Executive Summary"
II	"Program Integration and Data Management Module"
III	"Airloads Estimation Module"
IV	"Material Properties, Structure Temperature, Flutter, and Fatigue"
V	"Air Induction System and Landing Gear Modules"
VI	"Wing and Empennage Module"
VII	"Fuselage Module"
VIII	"Programmer's Manual"
IX	"User's Manual"
X	"Flutter Optimization Stand-Alone Program"
XI	"Flexible Airloads Stand-Alone Program"

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Section I

INTRODUCTION

The analytical structural weight prediction procedure in SWEEP is an intergration of methods formulated to describe design criteria and constraints of aircraft components, synthesize structure to these requirements, and develop mass properties data. Various procedures, engineering methods, and computer programming techniques used in SWEEP provide comprehensive structural weight data in a single computer run.

The program is structured in a modular form which provides the user with multiple modes of operation. It is designed to operate as a fully integrated system such that compatible design constraints are satisfied by each of the structural components. SWEEP can also be used in stand-alone modes to evaluate individual components or develop design criteria. A stacked case capability is also provided which permits variation of any single design parameter without repeating other data.

SWEEP consists of modules which perform control and/or computational functions required for:

1. Master control
2. Input/output data processing
3. Vehicle performance data analysis
4. Vehicle geometry and initial weight distribution analysis
5. Basic flight design loads and fatique spectrum analysis
6. Fatigue and flutter requirement analysis
7. Material property descriptions and evaluation
8. Wing and empennage structural synthesis and weight analysis
9. Fuselage structural synthesis and weight analysis
10. Landing gear structural synthesis and weight analysis
11. Air induction system (nacelles, pylons, engine section, ducts, ramps, spikes) structural synthesis and weight analysis

Geometry definitions are based on mathematical approximations of vehicle physical features and structural arrangements. These definitions provide for weight sensitivity to configuration geometry and to geometric variations. The structural synthesis/weight analysis modules are designed to analytically evaluate design requirements and criteria and to synthesize structures for specified meterials and structural concepts. Structural elements are analyzed to satisfy strength, stiffness, life, local stability, and general stability requirements. The synthesis can be controlled to produce material sizing reflecting unconstrained "optimum" structural arrangements or to evaluate material requirements for design constraints resulting from compromises due to cost, producibility, maintainability, or unique local considerations. Some of these design constraints are:

1. Specified frame, stringer, rib, or spar spacings

2. Longeron locations

3. Frame or stringer geometry limits

4. Material minimum gages or fabrication minimums

5. Cutout sizes and locations

6. Bulkhead locations

Program logic is provided so that options are available to (1) control the scope of the analysis and the types of design information to be printed, and (2) provide for bypassing certain design data computations by user input of the pertinent information. The latter approach would be employed to substitute advanced engineering data which become available during the design cycle. Examples of these types of data are local description of geometry, gross design or net loads, and flutter stiffness requirements.

Section II

PROGRAM DESCRIPTION

APPROACH

SWEEP is an integrated program written in FORTRAN Extended compiler language for the CDC6600 computer with the SCOPE operating system, at WPAFB. The program consists of 253 routines and functions which are programmed in modular form using one level of overlay.

The basic program is structured to operate within a total of 50,000 octal (20,480 decimal) core locations. The appended version, SWEEP IV, which incorporates the additional capability for analyzing advanced composite wing and empennage structures, operates within a total of 100,000 octal core locations.

In order to operate within the computer core size restriction with a single level of overlay, various central memory minimization approaches are used. The main overlay (root segment) consists of the SWEEP control program, OLAY00, which is identified as overlay (0,0). Since OLAY00 always resides in central memory, it is structured only to provide executive controls. Specific control, data manipulation, and computation processes are performed in subprograms identified as overlays (n,0), where n is the unique integer assigned to each primary overlay. Other programming approaches used to operate within the central memory core restrictions are:

1. Small labeled common regions (253 words) reside with the main overlay
2. Data are stored and transmitted through an extensive use of mass storage files (188 records, approximately 55,000 words)
3. Certain analysis functions are subdivided into groupings of (n,0) overlays.
4. BUFFER IN/BUFFER OUT statements are used to maintain blank common between related (n,0) overlays
5. FORTRAN OPT=2 compiler is used to compile all SWEEP routines
6. PPLOADR is used to load the program

OVERLAY STRUCTURE

SWEEP is structured with a main overlay, overlay (0,0), and 18 primary (n,0) overlays. Analysis and data processing functions are performed either by individual (n,0) overlays or by groupings of (n,0) overlays. The designation "module" is assigned to unique function primary overlays or groupings of functional overlays.

Table 1 shows the SCOPE overlay directives and calling statements for the SWEEP control program and the 18 primary overlays. All discussions, and references to overlays in this report address the decimal primary-level identification number. Table 2 shows the arrangement of overlays, which constitute the 10 program modules. Overlay (18,0) in this table is the advanced composite link for wing and empennage structures. This is the only link structured to the 100,000 octal core size restriction.

Sequential flow diagram through the 18 primary overlays and all of the data processing and computational routines within each overlay are shown in Figure 1.

PROGRAM ROUTINES

The main overlay routine, OLAY00, logic flow diagram is shown in Figure 2. Additional discussions, autoflow chart, and listing for this routine are presented in Volume II.

Programmed methods and formulations, autoflow charts, and program listings are presented in separate volumes which discuss the SWEEP modules. References to the report volumes are presented in Table 2. Table 3 is an alphabetical listing of all SWEEP routines.

PERIPHERAL REQUIREMENTS

SWEEP requirements as a stand-alone computing system consist of four input/output files and one mass storage file, file 1. These files consist of:

1. Mass storage file 1, TAPE1

2. System input file, TAPE5

3. System output file, TAPE6

4. Permanent data file, TAPE7

5. Common storage file, TAPE24

In addition to the foregoing files which are used during execution of the program, the method of operating shown in examples in Section III requires one magnetic tape unit. The program and permanent data are maintained on a magnetic tape and are transferred to internal files by the CDC control cards.

DATA PROCESSING

Blank common, labeled common, and mass storage files are used for the placement and retrieval of data. These media are readily made accessible to any unit of the program. Data sets are assigned to specific regions in blank common for each module and are maintained in multioverlay modules by the use of the BUFFER IN/BUFFER OUT statements.

Problem analysis controls and certain design data items are stored in labeled common blocks. These blocks are in the main overlay, and thus reside in core at all times and are universally accessible. These labeled common arrays are IFL, IP, and XMISC. Organization and discussion of variables in these common blocks are presented in Section III of this volume.

Mass storage file records are used to transmit design information between the input data processing module, design data development modules, weight analysis modules, and the output module. These records are also used within modules for temporary storage of data sets. Use of these files provides a means of transmitting the large amount of data required by this program within the restriction on core size. Discussion of the 188 file records used in SWEEP are presented in Section III of this volume.

TABLE 1. SWEEP OVERLAY DIRECTIVES AND CALLING STATEMENTS

Overlay Directive (Octal)	Calling Statement (Decimal)	Control Routine Name
OVERLAY(ALPHA,0,0)		OLAY00
OVERLAY(ALPHA,1,0)	OVERLAY(5HALPHA,1,0)	READ
OVERLAY(ALPHA,2,0)	OVERLAY(5HALPHA,2,0)	DATAIN
OVERLAY(ALPHA,3,0)	OVERLAY(5HALPHA,3,0)	OLAY3
OVERLAY(ALPHA,4,0)	OVERLAY(5HALPHA,4,0)	BLCNTL
OVERLAY(ALPHA,5,0)	OVERLAY(5HALPHA,5,0)	FATGUE
OVERLAY(ALPHA,6,0)	OVERLAY(5HALPHA,6,0)	LANDGR
OVERLAY(ALPHA,7,0)	OVERLAY(5HALPHA,7,0)	AISMN
OVERLAY(ALPHA,10,0)	OVERLAY(5HALPHA,8,0)	OLAY8
OVERLAY(ALPHA,11,0)	OVERLAY(5HALPHA,9,0)	OLAY9
OVERLAY(ALPHA,12,0)	OVERLAY(5HALPHA,10,0)	OLAY10
OVERLAY(ALPHA,13,0)	OVERLAY(5HALPHA,11,0)	FUS01
OVERLAY(ALPHA,14,0)	OVERLAY(5HALPHA,12,0)	FUS02
OVERLAY(ALPHA,15,0	OVERLAY(5HALPHA,13,0)	OUTPUT
OVERLAY(ALPHA,16,0)	OVERLAY(5HALPHA,14,0)	OLAY14
OVERLAY(ALPHA,17,0)	OVERLAY(5HALPHA,15,0)	OLAY15
OVERLAY(ALPHA,20,0)	OVERLAY(5HALPHA,16,0)	OLAY16
OVERLAY(ALPHA,21,0)	OVERLAY(5HALPHA,17,0)	OLAY17
OVERLAY(ALPHA,22,0)	OVERLAY(5HALPHA,18,0)	OLAY18

TABLE 2. MODULE DESCRIPTIONS

Module Name	Module Type	Overlay	Control Routine Name	Report Volume
Input data processing	Input data processing	(01,0)	READ	Vol II
Data management	Data development	(02,0)	DATAIN	Vol II
Flutter and temperature	Data development	(03,0)	OLAY3	Vol IV
Airloads	Data development	(04,0)	BLCNTL	Vol III
Fatigue	Data development	(05,0)	FATGUE	Vol IV
Landing gear	Structural synthesis and weight analysis	(06,0)	LANDGR	Vol V
Air induction system	Structural synthesis and weight analysis	(07,0)	AISMN	Vol V
Wing and empennage	Structural synthesis and weight analysis	(08,0) (09,0) (10,0) (14,0) (15,0) (16,0) (17,0) (18,0)	OLAY8 OLAY9 OLAY10 OLAY14 OLAY15 OLAY16 OLAY17 OLAY18	Vol VI
Fuselage	Structural synthesis and weight analysis	(11,0) (12,0)	FUS01 FUS02	Vol VII
Output	Output,data processing	(13,0)	OUTPUT	Vol II

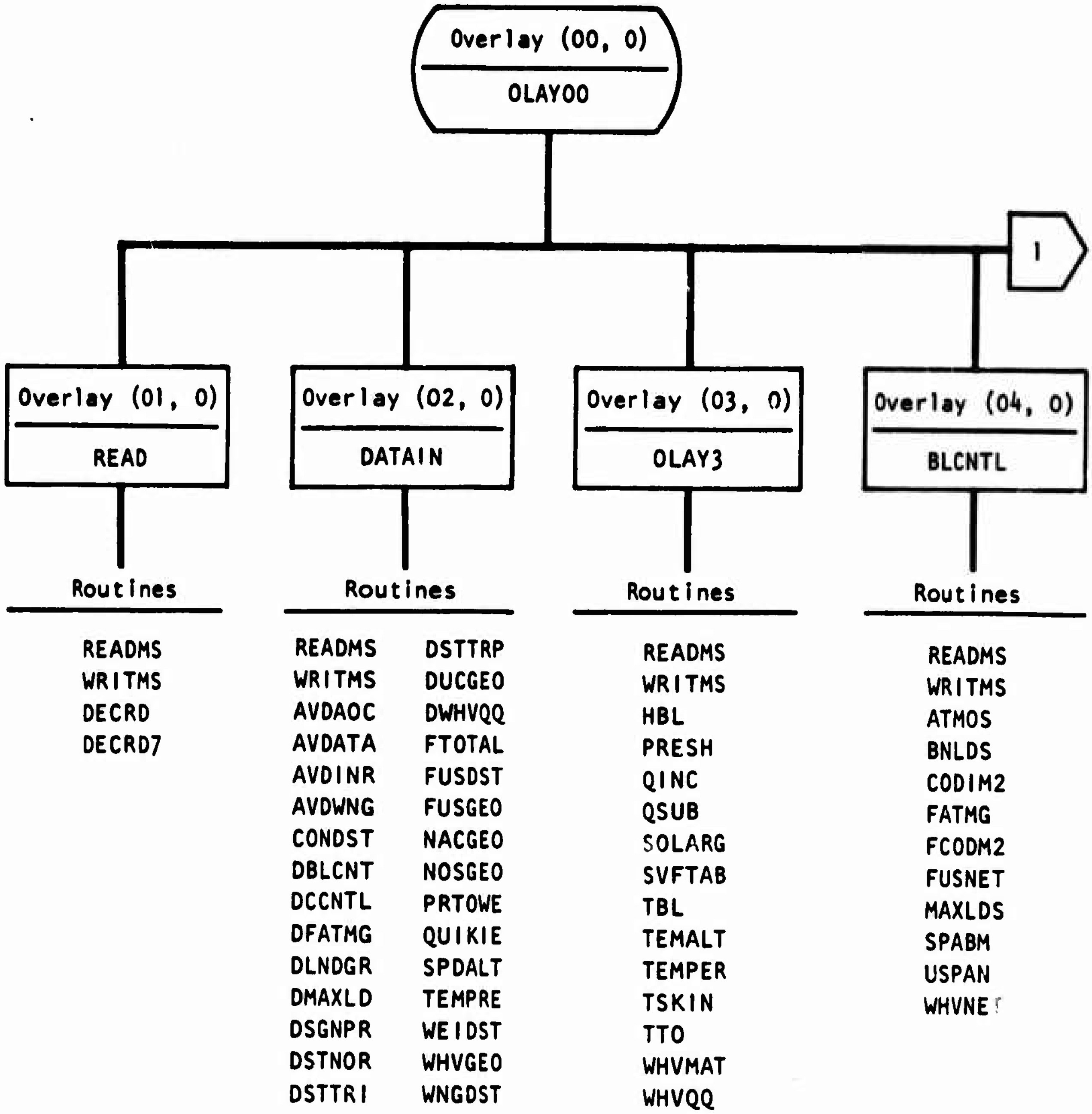


Figure 1. SWEEP overlay structure.

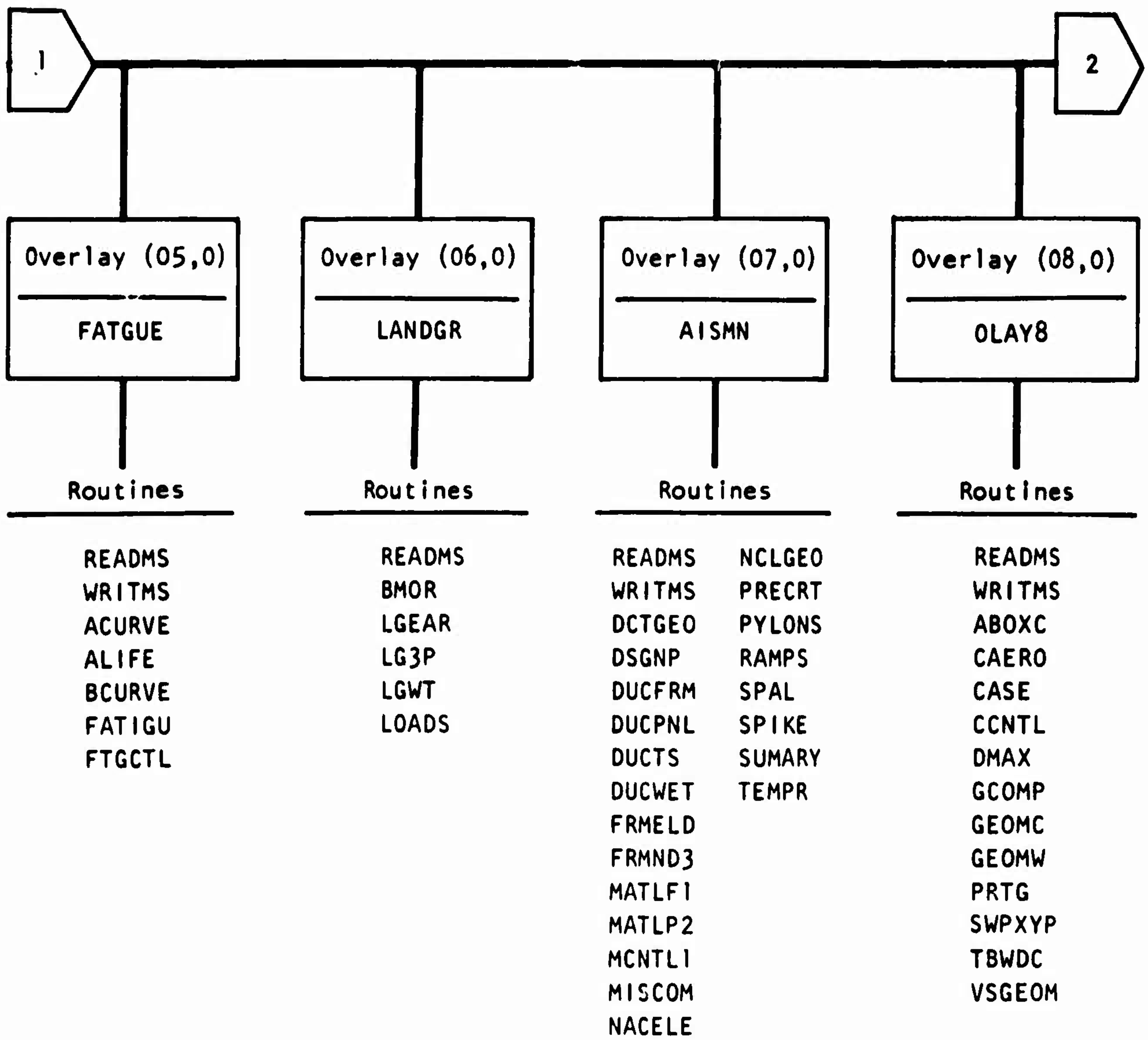


Figure 1. SWEEP overlay structure (cont).

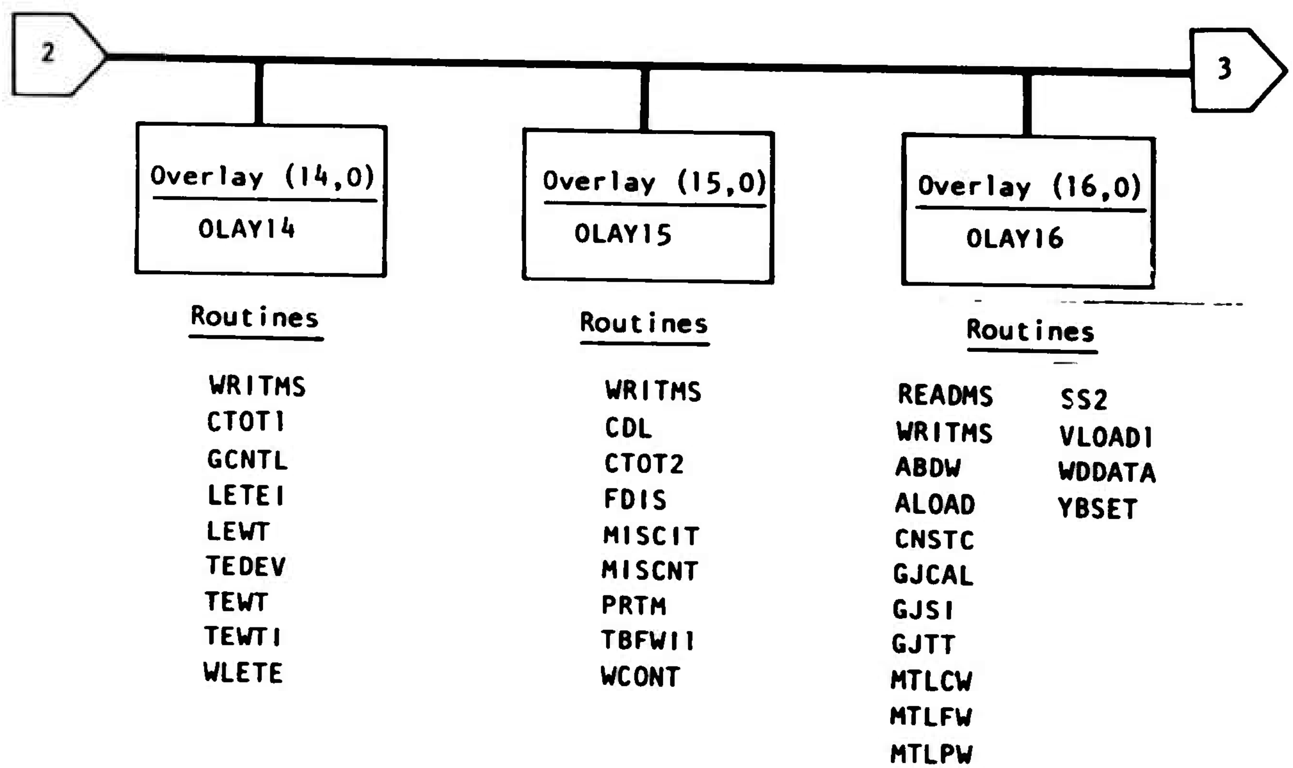


Figure 1. SWEEP overlay structure (cont).

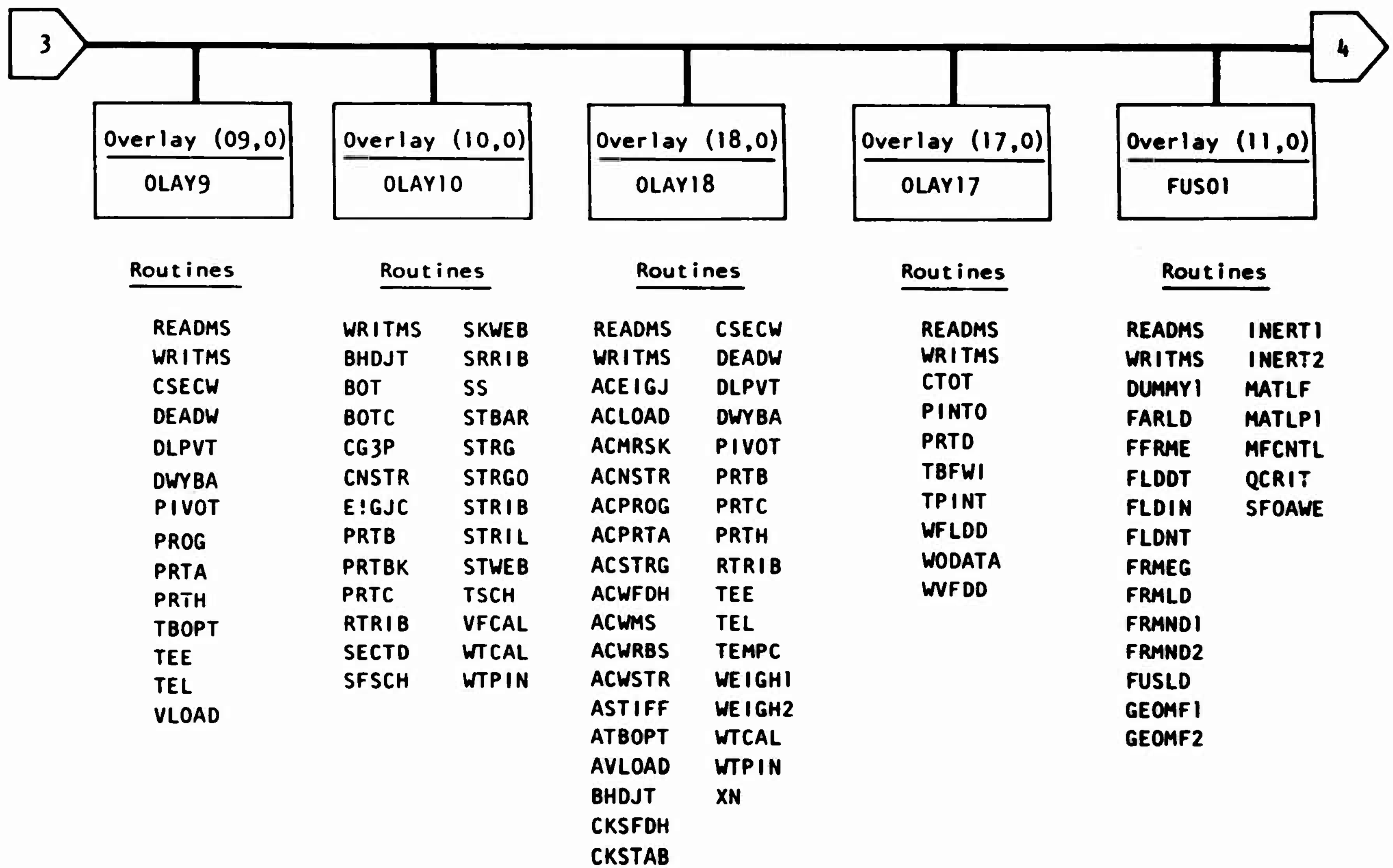
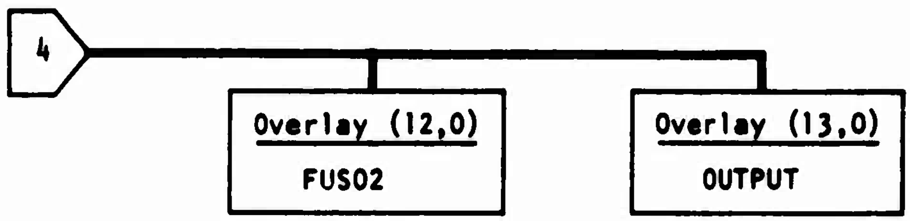


Figure 1. SWEEP overlay structure (cont).



Routines		Routines
READMS	LDCHK	READMS
BLKHDS	LONGS	
CUTOUT	MINFR	
CVPRES	MINMUM	
DBLKHD	MISCWT	
FBEND	PARTIT	
FCOVER	SECOST	
FHCMB	SPRINT	
FPANEL	SUMMRY	
FUSSHL	WTDIST	
FWEIGH		
GJ1GEO		
GJ2GEO		
I1LONG		
I2LONG		

Figure 1. SWEEP overlay structure (concl).

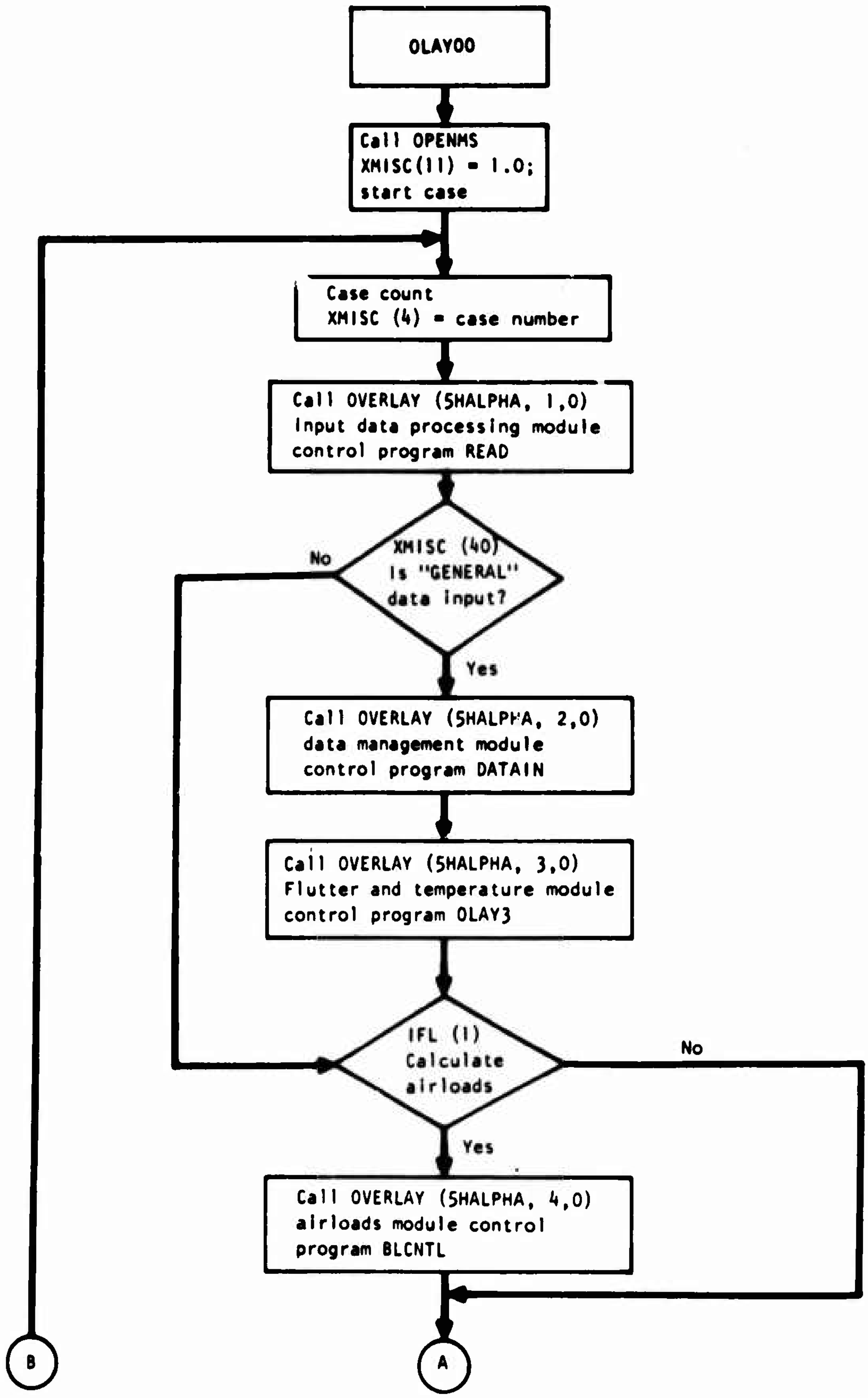


Figure 2. SWEEP control program logic flow diagram.

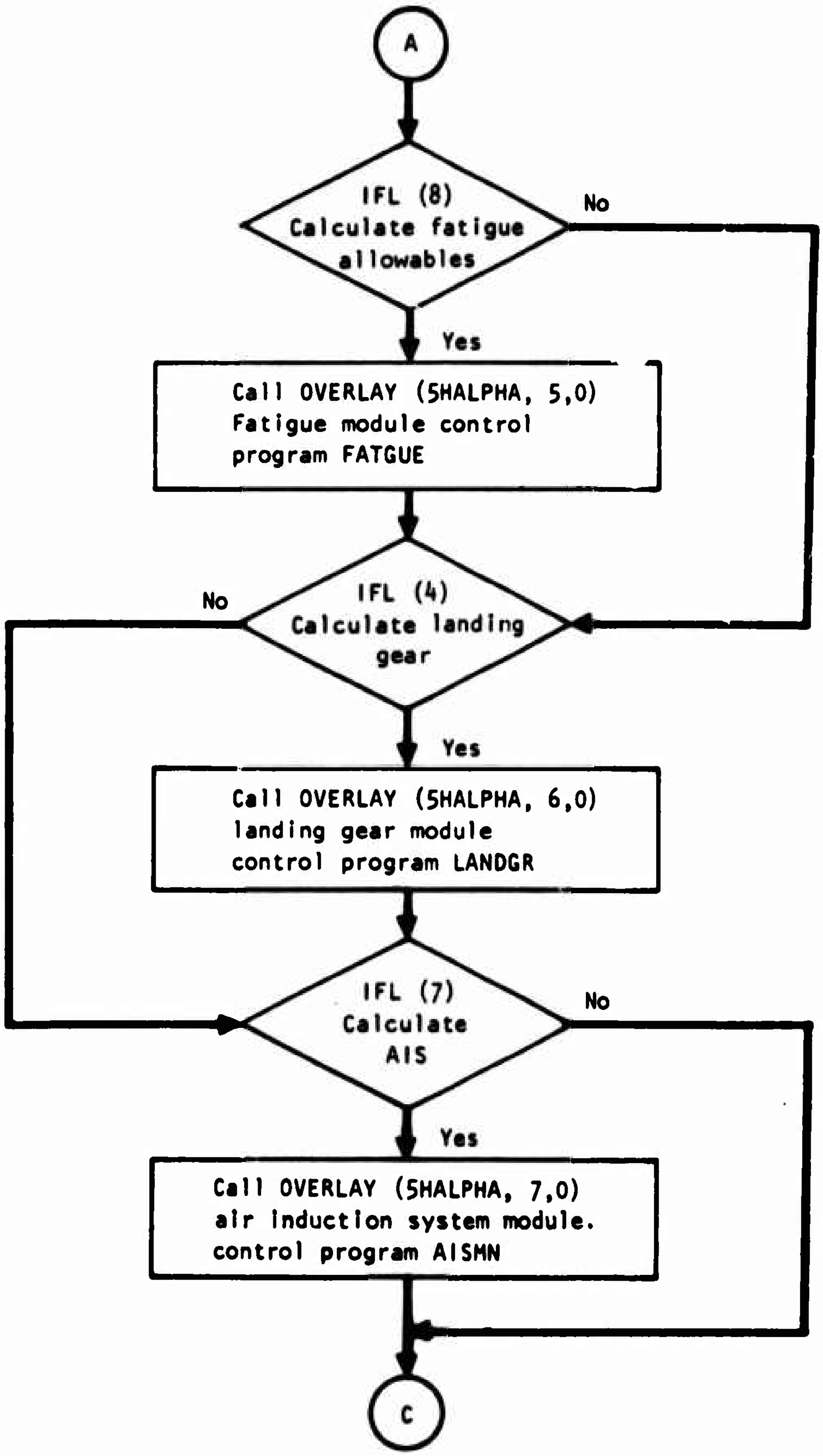


Figure 2. SWEEP control program logic flow diagram (cont).

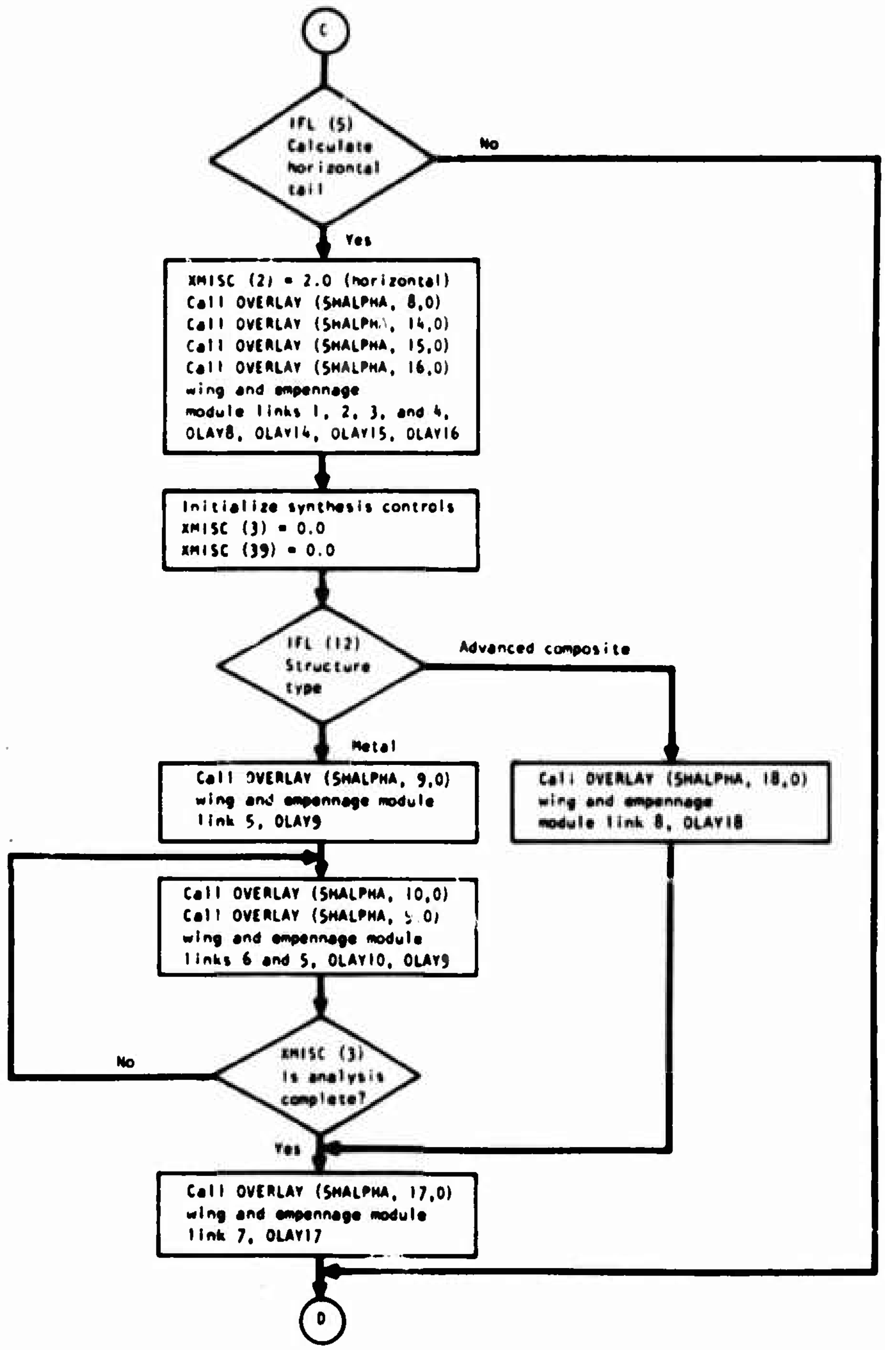


Figure 2. SWEEP control program logic flow diagram (cont).

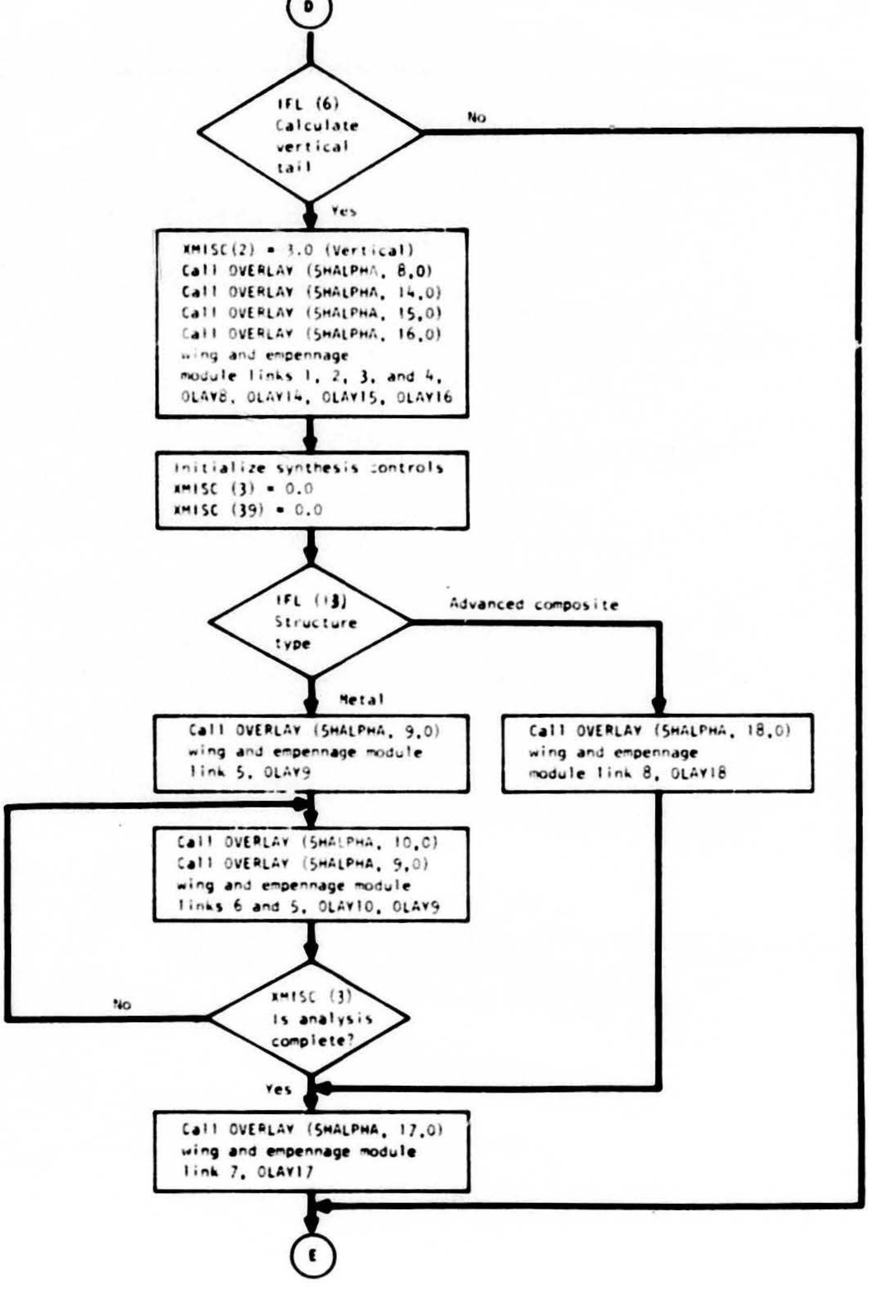


Figure 2. SWEEP control program logic flow diagram (cont).

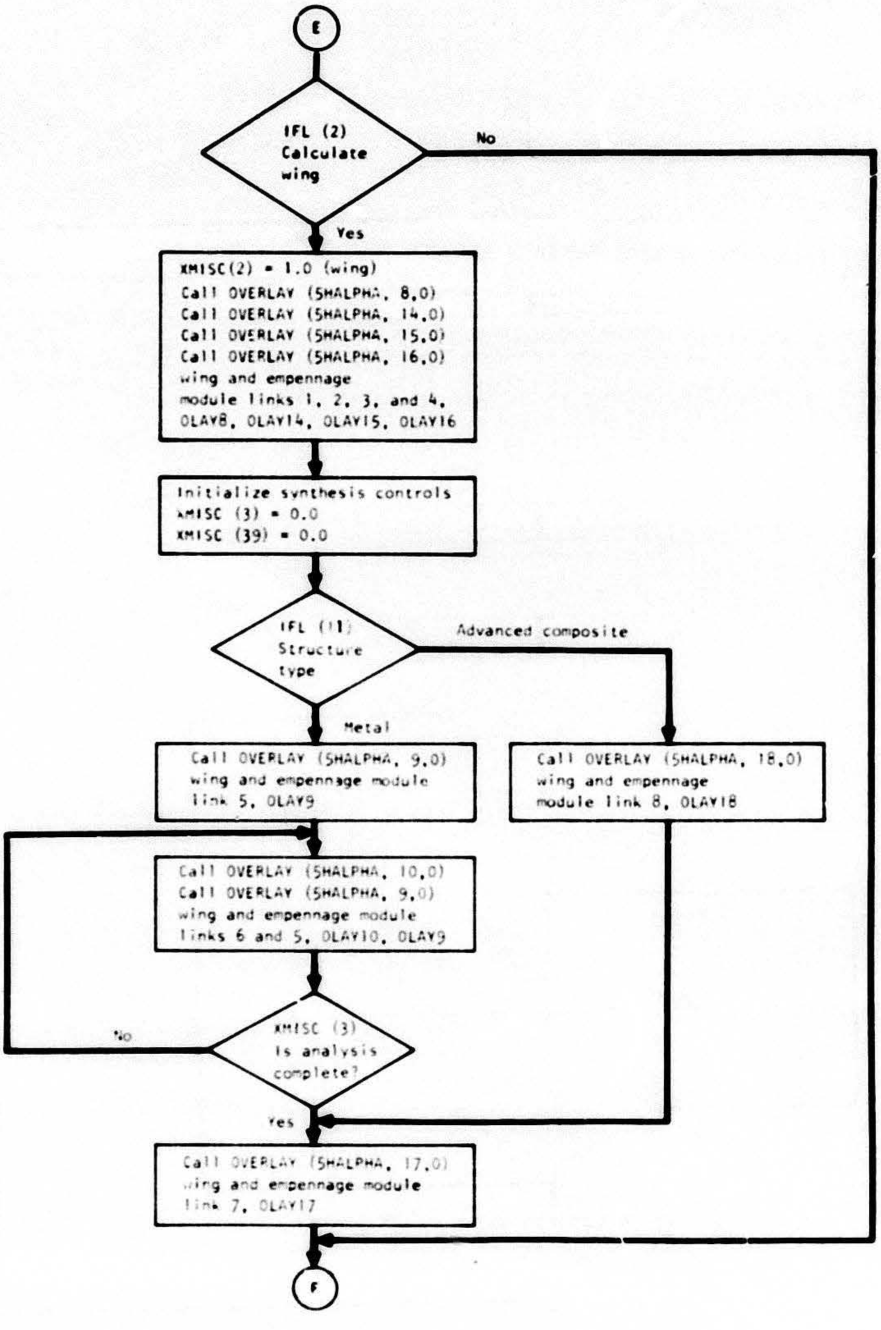


Figure 2. SWEEP control program logic flow diagram (cont).

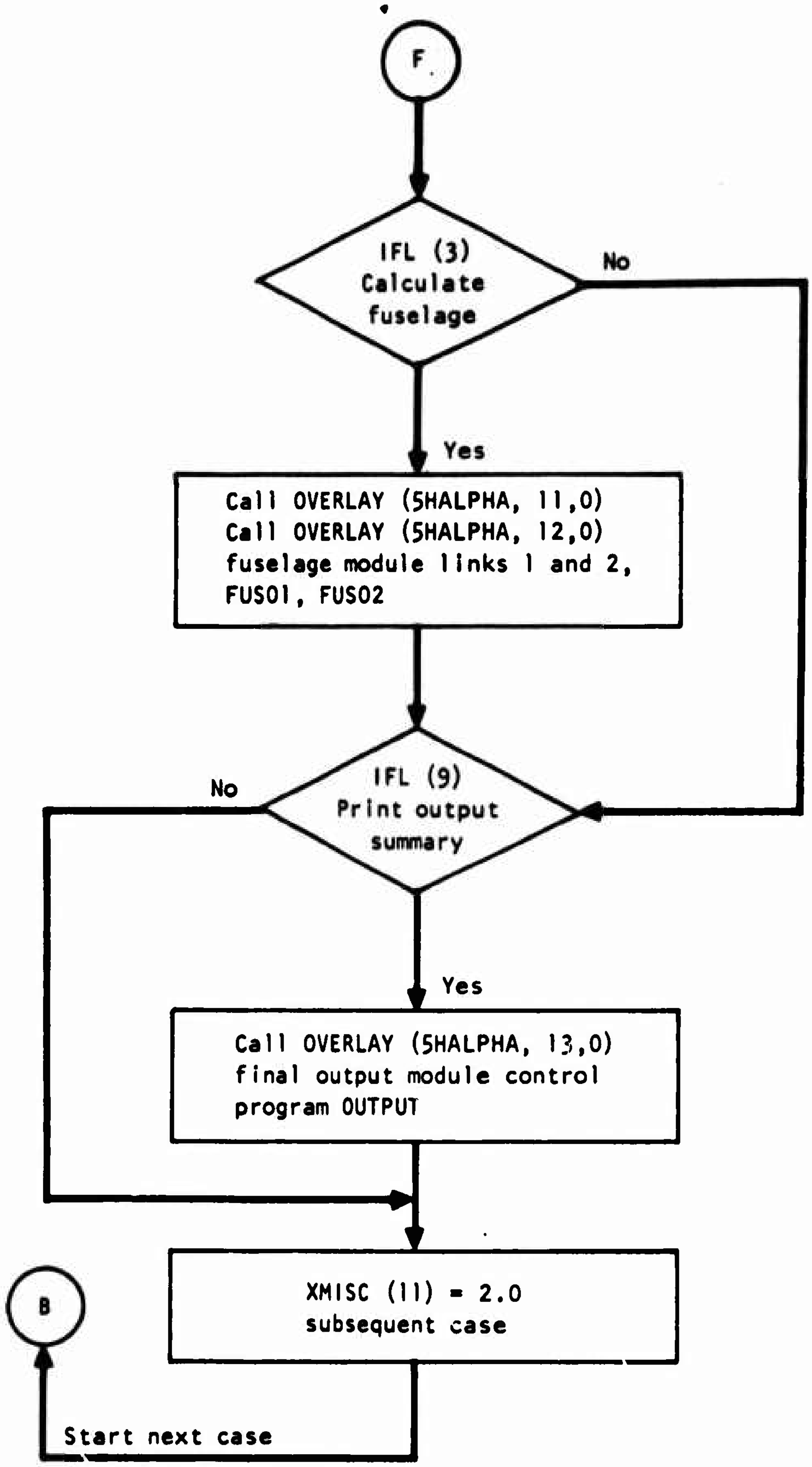


Figure 2. SWEEP control program logic flow diagram (concl).

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES

DECK NAME	OVERLAY	- . - . - DESCRIPTION - . - . - . - . - . - . - . -
ABDW	16	INITIAL STRUCTURE AND CONTENT INERTIA LOAD SETUP
ABOXC	08	TORQUE-BOX CROSS-SECTIONAL AREA INTEGRATION
ACEIGJ	18	TORQUE-BOX EI/GJ EVALUATION - ADV. COMP. ANALYSIS
ACLOAD	18	DESIGN LOAD DATA PROCESS - ADV. COMP. ANALYSIS
ACMRSK	18	SKIN-STS LOAD DIST. SKIN STABILITY -ADV.COMP.ANALYSIS
ACNSTR	18	SECTION DESIGN DATA/WT ANALYSIS CONTROL - ADV. COMP.
ACPROG	18	TOTAL SURFACE WEIGHT SYNTHESIS CONTROL - ADV. COMP.
ACPRTA	18	DESIGN DATA PRINT-TYPE A TORQUE-BOX SYNTHESIS SUMMARY
ACSTRG	18	STRINGER GEOMETRY/SECTION PROPERTIES-ADV.COMP.ANALYSIS
ACURVE	05	CYCLIC STRESS-STRAIN CURVE CALCULATION
ACWFDH	18	FULL DEPTH HC SECTION OPTIMIZATION - ADV.COMP.ANALYSIS
ACWMS	18	M/SPAR, FDH TORQUE-BOX SYNTHESIS - ADV.COMP.ANALYSIS
ACWRBS	18	M/RIB TORQUE-BOX SYNTHESIS - ADV. COMP. ANALYSIS
ACWSTR	18	SKIN-STR/RIB SECTION OPTIMIZATION - ADV.COMP.ANALYSIS
AISMN	07	PROGRAM FOR AIR INDUCTION SYSTEM MODULE
ALIFE	05	LIFE CALCULATION BY STRAIN-CYCLING METHOD
ALOAD	16	DESIGN AIRLOAD PROCESSING
ASTIFF	18	TORQUE-BOXSTIFFNESS EVALUATION - ADV.COMP.ANALYSIS
ATBOPT	18	ADV. COMP. TORQUE-BOX SYNTHESIS CONTROL
ATMOS	04	ATMOSPHERE. RETURNS DENSITY,PRESSURE,TEMP. FOR ALT.
AVDAOC	02	ADD OTHER COMPONENTS. FOR SUBROUTINE AVDATA.
AVDATA	02	DEVELOP TOTAL VEHICLE WEIGHT, CG, AND INERTIA DATA.
AVDINR	02	CALCULATE INERTIAS FOR SUBROUTINE AVDATA.
AVDWNG	02	WING AND CONTENTS WEIGHT AND CG FOR SUBROUTINE AVDATA
AVLOAD	18	NET ULT. LOADS CALC. - ADV. COMP. ANALYSIS
BCURVE	05	STRAIN VS CYCLES-TO-FAILURE CURVE CALCULATION
BHDJT	10	BULKHEAD AND JOINT WEIGHT EVALUATION
BHDJT	18	BULKHEAD AND JOINT WEIGHT EVALUATION
BLCNTL	04	PROGRAM FOR AIRLOADS MODULE. LOGIC AND CONTROL
BLKHDS	12	LOCATE BULKHEADS - GEOM., WEIGHT, PRESSURE LOADING
BMOR	06	BENDING MODULUS OF RUPTURE
BNLDS	04	COMPONENT TOTAL AIRLOADS AND CP.S. AND INERTIA FACTORS
BOT	10	INTERPOLATION/EVALUATION FOR FC OR B/T
BOTC	10	PLATE BUCKLING B/T EVALUATION
CAERO	08	TRAPEZOIDAL/TOTAL PLANFORM CHORD EVALUATION

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES (CONT)

DECK NAME	OVERLAY	- • - • - DESCRIPTION - • - • - • - • - • - • - • -
CASE	08	GENERAL DATA INITIALIZATION AND CONTROL
CCNTL	08	INITALIZATION - DATA TRANSFER FROM GENERAL DATA
CDL	15	EXTERNAL CONCENTRATED DEADWEIGHT EVALUATION
CG3P	10	PARABOLIC CURVE FIT AND EVALUATION
CKSFDH	18	STABILITY CHECK FOR FULL DEPTH HC CORE -ADV.COMP.SKINS
CKSTAB	18	COMP/SHEAR STABILITY CHECK FOR ADV. COMP. PANELS
CNSTC	16	STRUCTURAL SYNTHESIS CONSTANTS AND DATA SETUP
CNSTR	10	TORQUE-BOX SYNTHESIS/WEIGHT ANALYSIS CONTROL
CODIM2	04	INTERPOLATION BETWEEN POINTS OF A CURVE
CONDST	02	DISTRIBUTION OF FIXED FUS. CONTENTS TO SYNTHESIS SEGS.
CSECW	09	CENTER-SECTION WEIGHT EVALUATION
CSECW	18	CENTER-ZECTION WEIGHT EVALUATION
CTOT	17	PLANFORM CHORD EVALUATION
CTOT1	14	PLANFOR* CHORD EVALUATION
CTOT2	15	PLANFORM CHORD EVALUATION
CUTOUT	12	DEVELOP PANEL NET EFFECTIVENESS DUE TO CUTOUTS
CVPRES	12	COVER SYNTHESIS, PRESSURE FOR CABIN,FUEL OR COMPARTM.
DATAIN	02	PROGRAM FOR DATA MANAGEMENT MODULE. FLOW CONTROL
DBLCNT	02	PUT VEHICLE DATA IN BC ARRAY AS REQ. FOR AIRLOADS MOD.
DBLKHD	12	BULKHEAD SYNTHESIS
DCCNTL	02	SAVE WING AND TAILS GEOM., EST.WT. AND CG FOR WHV MOD.
DCTGEO	07	DUCT GEOMETRY EVALUATION
DEADW	09	CURRENT TORQUE-BOX INERTIA LOAD EVALUATION
DEADW	18	CURRENT TORQUE-BOX INERTIA LOAD EVALUATION
DECRD	01	RELATIVE READ FOR INPUT STREAM
DECRD7	01	RELATIVE READ FOR TAPE 7
DFATMG	02	SAVE WT.RATIOS,MOMENTS,ETC. FOR FATIGUE -AIRLOADS MOD.
DLNDGR	02	SAVE DATA FOR LANDING GEAR MODULE
DLPVT	09	EVALUATION OF BOX STRUCTURE REPLACED BY PIVOT
DLPVT	18	EVALUATION OF BOX STRUCTURE REPLACED BY PIVOT
DMAX	08	AIRFOIL DEPTH EVALUATION
DMAXLD	02	1G INERT. SHEAR,TORQUE,BEND.MOM. AT CUTS FOR WHV MOD.
DSGNP	07	SETUP TEMP. AND PRESS. FACTORS FOR AIR INDUC. SYSTEM.
DSGNPR	02	SETUP TEMP. AND PRESS. FACTORS FOR AIR INDUC. SYSTEM.
DSTNOR	02	DISTRIBUTE POINT WEIGHT BY STATION SPACING.

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES (CONT)

DECK NAME	OVERLAY	- • - • - DESCRIPTION - • - • - • - • - • - • - • -
DSTTRI	02	TRIANGULAR DISTRIBUTION OF POINT WT. TO STATIONS.
DSTTRP	02	TRAPEZOIDAL DISTRIBUTION OF POINT WT. TO STATIONS.
DUCFRM	07	DUCT FRAME SYNTHESIS
DUCGEO	02	DEVELOP DUCT GEOMETRY.
DUCPNL	07	DUCT PANEL SYNTHESIS
DUCTS	07	CONTROL AND PRINT FOR DUCTS
DUCWET	07	DUCT WEIGHT EVALUATION PER NACELLE OR AIR VEHICLE
DUMMY1	11	CHECK COMPATIBILITY OF DATA AND FORCE STAT.OR DYN.BAL.
DWHVQQ	02	SAVE SPEED-ALT. AND H-TAIL DATA FOR FLUT.-TEMP. MOD.
DWYBA	09	DEADWEIGHT/COUPLE ARM ADJUSTMENT FOR PASS I+1
DWYBA	18	DEADWEIGHT/COUPLE ARM ADJUSTMENT FOR PASS I+1
EIGJC	10	SECTION EI AND GJ STIFFNESS EVALUATION
FARLD	11	DISTRIBUTE LIFT LOADS OF FUS. NOSE AND WING CARRYOVER
FATGUE	05	PROGRAM FOR FATIGUE MODULE
FATIGU	05	INITALIZE, CONTROL ITERATION, PRINT FINAL RESULTS.
FATMG	04	BENDING MOMENT SPECTRA FOR MANEUVER, GUST AND TAXI
FBEND	12	LONGERON-STRINGER,BENDING,FORCED CRIPPLING,STIFFNESS
•FCODM2	04	INTERPULATION BETWEEN CURVES OF A FAMILY
FCOVER	12	COVER SYNTHESIS, STRENGTH, FLUTTER, ACOUSTICS
FDIS	15	FUEL WEIGHT/DIST AND INITIAL T-BOX WT. EVALUATION
FFRME	11	MAJOR FRAME SYNTHESIS CONTROL.
FHCMB	12	DUMMY - POTENTIAL FOR HONEYCOMB
FLDDT	11	SETUP EXTERNAL LOADS BY CONDITION TYPE
FLDIN	11	REORDER INPUT NET LOADS.
FLDNT	11	CALC. NET FUSELAGE SHEAR AND MOMENT DIAGRAMS
FPANEL	12	CONTROL FOR FRAME SPACING SEARCH
FRMEG	11	LOCATE EXTERNAL SUPPORT POINTS FOR WING,TAILS,L.G.,ETC
FRMELD	07	UNIT PRESSURE RING LOAD EVALUATION
FRMLD	11	ELASTIC CENTER APPROACH TO INTERNAL RING LOADS
FRMND1	11	DEVELOP FRAME NODES FOR ROUNDED RECTANGULAR GEOMETRY
FRMND2	11	DUMMY - POTENTIAL FOR FRAME NODES FOR ELLIPTICAL GEOM.
FRMND3	07	FRAME NODE COORDINATES(61 NODES) EVALUATION
FTGCTL	05	GENERAL,SET UP STRESS LEVELS FROM BEND.MOM.OR PRESSURE
FTOTAL	02	DISTRIBUTE FUSELAGE USEFUL LOAD AND CONTENTS FOR 3 WTS
FUSDST	02	DISTRIBUTION OF FUSELAGE STRUCTURAL WEIGHT TO SYN.SEGS

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES (CONT)

DECK NAME	OVERLAY	DESCRIPTION
FUSGEO	02	DEVELOP EXTERNAL SHELL GEOMETRY.
FUSLD	11	FUSELAGE LOADS CONTROL
FUSNET	04	SAVE SPECIFIC LOADS DATA FOR FUSELAGE MODULE
FUSSHL	12	SHELL SYNTHESIS CONTROL
FUS01	11	PROGRAM FOR FIRST FUSELAGE OVERLAY
FUS02	12	PROGRAM FOR SECOND FUSELAGE OVERLAY
FWEIGH	12	WEIGHT OF COVERS, LONGERONS AND MINOR FRAMES
GCNTL	14	TORQUE-BOX, LE, TE GEOMETRY DATA SETUP FOR WT ANALYSIS
GCOMP	08	WING,H,V GEOMETRY DATA PROCESSING FOR OUTPUT
GEOMC	08	GENERAL PLANFORM GEOMETRY AND T/C DATA SETUP
GEOMF1	11	FUSELAGE EXTERNAL SHELL GEOMETRY FOR ROUNDED RECTANGLE
GEOMF2	11	DUMMY - POTENTIAL FOR ELLIPTICAL SHAPES FOR SHELL GEOM
GEOMW	08	WING,H,V GEOMETRY EVALUATION AND CONTROL
GJCAL	16	FLUTTER GJ REQD CONTROL AND EVALUATION
GJSI	16	FLUTTER GJ REQD CALCULATION AT STATION I
GJTT	16	FLUTTER GJ REQUIRED FOR T TAILS
GJ1GEO	12	SECTION TORQUE GEOMETRY DUE TO CUTOUTS,DECKS,SHROUDS
GJ2GEO	12	DUMMY - POTENTIAL FOR ELLIPTICAL GJ1GEO
HBL	03	BOUNDARY LAYER HEAT TRANSFER
INERT1	11	UNIT PITCH, ROLL, YAW INERTIAS FOR ROUNDED RECTANGLES
INERT2	11	DUMMY - POTENTIAL USE FOR ELLIPTICAL UNIT INERTIAS
I1LONG	12	SECTION PROPERTIES FOR COVER,LONGERON /UNIT THICK,AREA
I2LONG	12	DUMMY - POTENTIAL FOR ELLIPTICAL I1LONG
LANDGR	06	PROGRAM FOR LANDING GEAR MODULE
LDCHK	12	SELECT CRITICAL DESIGN LOADS FOR SECTION SYNTHESIS
LETEI	14	LE/TE WEIGHT INTEGRATION
LEWT	14	LE WEIGHT AND DISTRIBUTION EVALUATION
LGEAR	06	COMPUTE LANDING GEAR LOADS
LGWT	06	COMPUTE LANDING GEAR WEIGHTS
LG3P	06	THREE POINT INTERPOLATION
LOADS	06	COMPUTE LOADS PARALLEL AND PERPEND. TO STRUT EACH COND
LONGS	12	CONTROL FOR STRINGER SEARCH AND LONGERON LOCATION
MATLF	11	INTERPOLATION FOR DESIRED TEMPERATURE ON MATERIAL DATA
MATLF1	07	MATERIAL PROPERTY CURVE FIT
MATLP1	11	MATERIAL PRINT - FUSELAGE COVER,LONGERONS,FRAMES

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES (CONT)

DECK NAME	OVERLAY	- . - . - DESCRIPTION - . - . - . - . - . - . - . -
MATLP2	07	MATERIAL PROPERTY DATA PRINT
MAXLDS	04	NET DESIGN LOAD ENVELOPE FOR EACH LIFTING SURFACE
MCNTL1	07	DEVELOP MATERIAL PROPERTIES FROM LIBRARY DATA
MFCNTL	11	DEVELOP MATERIAL PROPERTIES FROM LIBRARY DATA
MINFR	12	MINOR FRAMES - GENERAL STABILITY,FORCED CRIPPL.ACOUST.
MINMUM	12	OPTIMIZE BULKHEAD STIFFENER SPACING
MISCIT	15	MISC CONTENT WEIGHT INTEGRATION
MISCNT	15	MISC CONTENT WEIGHT/DISTRIBUTION EVAL/CONTROL
MISCOM	07	WEIGHTS OF ENG.MOUNTS. MISC.DOORS,ETC. APPLY K FACTOR
MISCWT	12	MISC. WEIGHTS - FITTINGS. ENGINE DRAG BEAM. EJEC.FRAME
MTLCW	16	MATERIAL PROPERTY PROCESSING CONTROL
MTLFW	16	MATERIAL PROPERTY CURVE FIT
MTLPW	16	MATERIAL PROPERTY DATA PRINT
NACELE	07	NACELLE SHELL WEIGHT
NACGEO	02	DEVELOP NACELLE GEOMETRY.
NCLGEO	07	DEVELOP NACELLE GEOMETRY
NOSGEO	02	DEFINE GEOMETRY OF NOSE SECTION.
OLAY00	00	SWEEP OVERLAY CONTROL PROGRAM
OLAY3	03	PROGRAM FOR FLUTTER AND TEMPERATURE MODULE
OLAY8	08	PROGRAM FOR FIRST OVERLAY OF WING-EMPENNAGE MODULE
OLAY9	09	PROGRAM FOR FIFTH OVERLAY OF WING-EMPENNAGE MODULE
OLAY10	10	PROGRAM FOR SIXTH OVERLAY OF WING-EMPENNAGE MODULE
OLAY14	14	PROGRAM FOR SECOND OVERLAY OF WING-EMPENNAGE MODULE
OLAY15	15	PROGRAM FOR THIRD OVERLAY OF WING-EMPENNAGE MODULE
OLAY16	16	PROGRAM FOR FOURTH OVERLAY OF WING-EMPENNAGE MODULE
OLAY17	17	PROGRAM FOR SEVENTH OVERLAY OF WING-EMPENNAGE MODULE
OLAY18	18	PROGRAM FOR EIGHTH OVERLAY OF WING-EMPENNAGE MODULE
OUTPUT	13	PROGRAM FOR FINAL OUTPUT MODULE (WEIGHT SUMMARY)
PARTIT	12	PARTITIONS - STATISTICAL WEIGHT ESTIMATE
PINTO	17	MASS/DESIGN DATA PUNCH/PRINT FOR FLUT. OPT. PROGRAM
PIVOT	09	WING PIVOT SYNTHESIS AND WEIGHT EVALUATION
PIVOT	18	WING PIVOT SYNTHESIS AND WEIGHT EVALUATION
PRECRT	07	DETERMINE CRITICAL RAMP DESIGN CRITERIA
PRESH	03	PRESSURE AT ALTITUDE
PROG	09	TOTAL SURFACE WEIGHT SYNTHESIS CONTROL

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES (CONT)

DECK NAME	OVERLAY	- • - • - DESCRIPTION - • - • - • - • - • - • -
PRTA	09	DESIGN DATA PRINT-TYPE A TORQUE-BOX SYNTHESIS SUMMARY
PRTB	10	DESIGN DATA PRINT-TYPE B SECTION DESIGN DETAIL SUMMARY
PRTB	18	DESIGN DATA PRINT-TYPE B SECTION DESIGN DETAIL SUMMARY
PRTBK	10	DESIGN DATA PRINT-DETAIL SYNTHESIS SEARCH DATA
PRTC	10	DESIGN DATA PRINT-TYPE C SECTION DESIGN DETAIL SUMMARY
PRTC	18	DESIGN DATA PRINT-TYPE C SECTION DESIGN DETAIL SUMMARY
PRTD	17	WING,H,V WEIGHT SUMMARY PRINT
PRTG	08	WING,H,V GEOMETRY DATA PRINT
PRTH	09	DESIGN DATA PRINT-TYPE H C-SEC/PIVOT DESIGN SUMMARY
PRTH	18	DESIGN DATA PRINT-TYPE H C-SEC/PIVOT DESIGN SUMMARY
PRTM	15	DESIGN DATA PRINT - MISC. CONTENT MASS DATA
PRTOWE	02	PRINT OPERATIONAL WEIGHT EMPTY AND EXPEND. USEFUL LOAD
PYLONS	07	PYLON AND FITTING WEIGHT
QCRIT	11	DETERMINE CRITICAL DYNAMIC PRESSURE FOR PANEL FLUTTER
QINC	03	INCOMP. DYNAMIC PRESH. FOR MACH, LOC.PRESH., LOC.TEMP.
QSUB	03	DESIGN DYNAMIC PRESH. CORRECTED FOR COMPRES. EFFECTS
QUIKIE	02	FIRST PASS WEIGHT AND C.G. ESTIMATES.
RAMPS	07	RAMP PROPERTIES FOR 2 TO 4 RAMPS PER INLET.
READ	01	PROGRAM FOR INPUT DATA PROCESSING MODULE
RTRIB	10	ROOT RIB AND SHEAR TIE WEIGHT EVALUATION
RTRIB	18	ROOT RIB AND SHEAR TIE WEIGHT EVALUATION
SECOST	12	WEIGHT OF SECONDARY STRUCTURE
SECTD	10	TORQUE-BOX SECTION SYNTHESIS-SEARCH LEVEL 1 CONTROL
SFUAWE	11	FRAME SYNTHS. FOR COMPOSITE INTERN.LOADS AND MATERIAL
SFSCH	10	SEARCH LEVEL 2 CONTROL--DESIGN STRESS
SKWEB	10	SPAR WEB CRITICAL STRESS EVALUATION
SOLARG	03	SUN FLUX AS FUNCTION OF ALTITUDE
SPABM	04	WING AND EMPENN. SPANWISE SH-B.M-TOR. FROM AIRLOADS
SPAL	07	SETUP TEMP. AND PRESS. FOR 9 PT. SPEED PROFILE.
SPDALT	02	SETUP TEMP. AND PRESS. FOR 9 PT. SPEED PROFILE.
SPIKE	07	WEIGHT FOR SPIKES BY STATISTICAL EQUATIONS
SPRINT	12	FUSELAGE PRINT
SRRIB	10	RIB T-WEB EVALUATION
SS	10	STRESS-STRAIN CURVE EVALUATION AT GIVEN STRESS
SS2	16	STRESS-STRAIN CURVE EVALUATION AT GIVEN STRESS

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES (CONT)

DECK NAME	OVERLAY	DESCRIPTION
STBAR	10	TOTAL COVER/SUPT STRUCTURE T-BAR EVALUATION
STRG	10	STRINGER/CAP OPT MATL DIST/GEOMTRY EVALUATION
STRGO	10	STRINGER/CAP GEOMETRY/BOUNDARY INITIALIZATION
STRIB	10	RIB T-BAR SYNTHESIS AND CONTROL
STRIL	10	STRINGER COLUMN LENGTH EVALUATION
STWEB	10	FRONT/REAR SPAR CAP/WEB EVALUATION AND CONTROL
SUMARY	07	SUMMARIZE AIS WEIGHTS AND C.G.S AND PRINT
SUMMRY	12	SUMMARIZE WEIGHTS AND DETERMINE C.G.DATA
SVFTAB	03	INTERPOLATED FLUTTER PARAMETER FOR EACH SURFACE
SWPXYP	08	EVALUATION OF X.Y COORD. OF ROTATED POINT
TBFWI	17	FUEL/TORQUE-BOX WEIGHT INTEGRATION
TBFWI1	15	FUEL/TORQUE-BOX WEIGHT INTEGRATION
TBL	03	TEMPERATURE OF BOUNDARY LAYER
TBOPT	09	TOTAL TORQUE-BOX WEIGHT OPTIMIZATION CONTROL
TBWDC	08	TORQUE-BOX SECTION GEOMETRY EVALUATION
TEDEV	14	TRAILING EDGE DEVICE WEIGHT ESTIMATION
TEE	09	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
TEE	18	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
TEL	09	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
TEL	18	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
TEMALT	03	LOCAL TEMPERATURE AT ALTITUDE
TEMPC	18	MATERIAL PROPERTIES EVAL FOR ADV. COMP. ANALYSIS
TEMPER	03	CONTROL SKIN TEMP. ITTERATION FOR A MACH AND ALTITUDE
TEMPR	07	TEMP/PRESSURE EVAL PROGRAM AT GIVEN GEOPOTENTIAL ALT
TEMPRE	02	TEMPERATURE AND PRESSURE FOR GEOPOTENTIAL ALTITUDE.
TEWT	14	TE WEIGHT/DISTRIBUTION EVALUATION AND CONTROL
TEWTI	14	TE DEVICE WEIGHT/DISTRIBUTION EVALUATION
TPINT	17	PARABOLIC CURVE FIT AND EVALUATION
TSCH	10	SEARCH LEVEL 3 CONTROL--OPTIMUM T(SKIN)/A(STR.CAP)
TSKIN	03	SKIN TEMPERATURE
TTO	03	TOTAL TEMPERATURE FUNC. MACH AND LOCAL TEMP.
USPAN	04	WING AND EMPENNAGE UNIT AIRLOAD DISTRIBUTIONS
VFCAL	10	SECTION TORSIONAL STIFFNESS REQMT EVALUATION
VLOAD	09	ULTIMATE NET DESIGN LOADS PROCESSING
VLOAD1	16	ULTIMATE NET DESIGN LOADS PROCESSING

TABLE 3. ALPHABETIC LIST AND DESCRIPTION OF SWEEP ROUTINES (CONCL)

DECK NAME	OVERLAY	DESCRIPTION
VSGEOM	08	ROTATED SURFACE PLANFORM GEOMETRY EVALUATION
WCONT	15	CONTROL FOR WEIGHT ESTIMATION OF CONTENTS
WDDATA	16	DESIGN DATA GENERATION CONTROL
WEIDST	02	INITIAL DIST. OF OPER. WT. EMPTY TO COMPONANTS
WEIGH1	18	SECTION WT/INCH FOR ADV. COMP M/SPAR, FDH TORQUE-BOX
WEIGH2	18	SECTION WT/INCH FOR ADV. COMP. M/RIB TORQUE-BOX
WFLDD	17	MASS/DESIGN DATA CALC/OUTPUT FOR FLEX LOADS PROGRAM
WHVGEO	02	DEVELOP GEOMETRY OF WING, HORIZONTAL AND VERTICAL
WHVMAT	03	TEMP. VS. COMPRESSION YIELD STRESS AND SHEAR MODULUS
WHVNET	04	NORMALIZING FACT. AND NET LOADS, SAVES FOR WHV MODULE
WHVQQ	03	CONTROL FOR COMPRES. CORRECTION FOR G, SHEAR MODULUS
WLETE	14	LEADING EDGE - TRAILING EDGE WEIGHT ESTIMATION CONTROL
WNGDST	02	WEIGHT DISTRIBUTION FOR WING AND CONTENTS.
WODATA	17	WING,H,V ANALYSIS OUTPUT DATA CONTROL
WTCAL	10	SECTION/PANEL WEIGHT EVALUATION AND CONTROL
WTCAL	18	SECTION/PANEL WEIGHT EVALUATION AND CONTROL
WTDIST	12	DUMMY - POTENTIAL REDIST. WEIGHT FOR ITERATION
WTPIN	10	SECTION WEIGHT/INCH EVALUATION
WTPIN	18	SECTION WEIGHT/INCH EVALUATION
WVFDD	17	MASS/DESIGN DATA CALC. FOR FLUTTER OPT. PROGRAM
XN	18	EVALUATION OF NO. OF N-PLIES FOR GIVEN L,M PLIES
YBSET	16	EFFECTIVE BOX DEPTH INITIALIZATION

Section III

PROGRAM OPERATION

As an integrated engineering program, SWEEP requires three types of external data: (1) an input data set that is used to describe the design problem, (2) a data bank compilation of engineering data from which necessary design information can be drawn, as required, and (3) an input set of program analysis control words. The modules of SWEEP logically interpret the problem design information, convert them into engineering data, and order the results properly for all the evaluation routines. Mass storage files are used to transmit design information from design data modules to the weight analysis modules, which perform the necessary structural synthesis/weight analysis so that the primary result is a set of weight estimates for the major structural components.

INPUT ARRANGEMENT

Figure 3 shows a typical input card deck setup for a SWEEP run. This arrangement assumes that all SWEEP routines are stored in object form as the first file of a tape by the use of the COPYLIB operation. Also, that the second file of that tape is the permanent data stored in card image format. Figure 4 shows the sequential order of the data bank data deck. This set is used to create the permanent data file and, subsequently, TAPE7.

PERMANENT DATA BANK DECK

The permanent data bank deck, Figure 4, consists of the following:

1. Aerodynamic data for loads
2. Spectrum data for fatigue
3. Weight analysis constants and index factors
4. Flutter and temperature constants
5. Weight constants and data for initial weight distribution
6. Airfoil description
7. Material property descriptions

Records in this data bank are used to initialize mass storage, file, design data records for use by the different program modules. A description of these records is presented in Table 4.

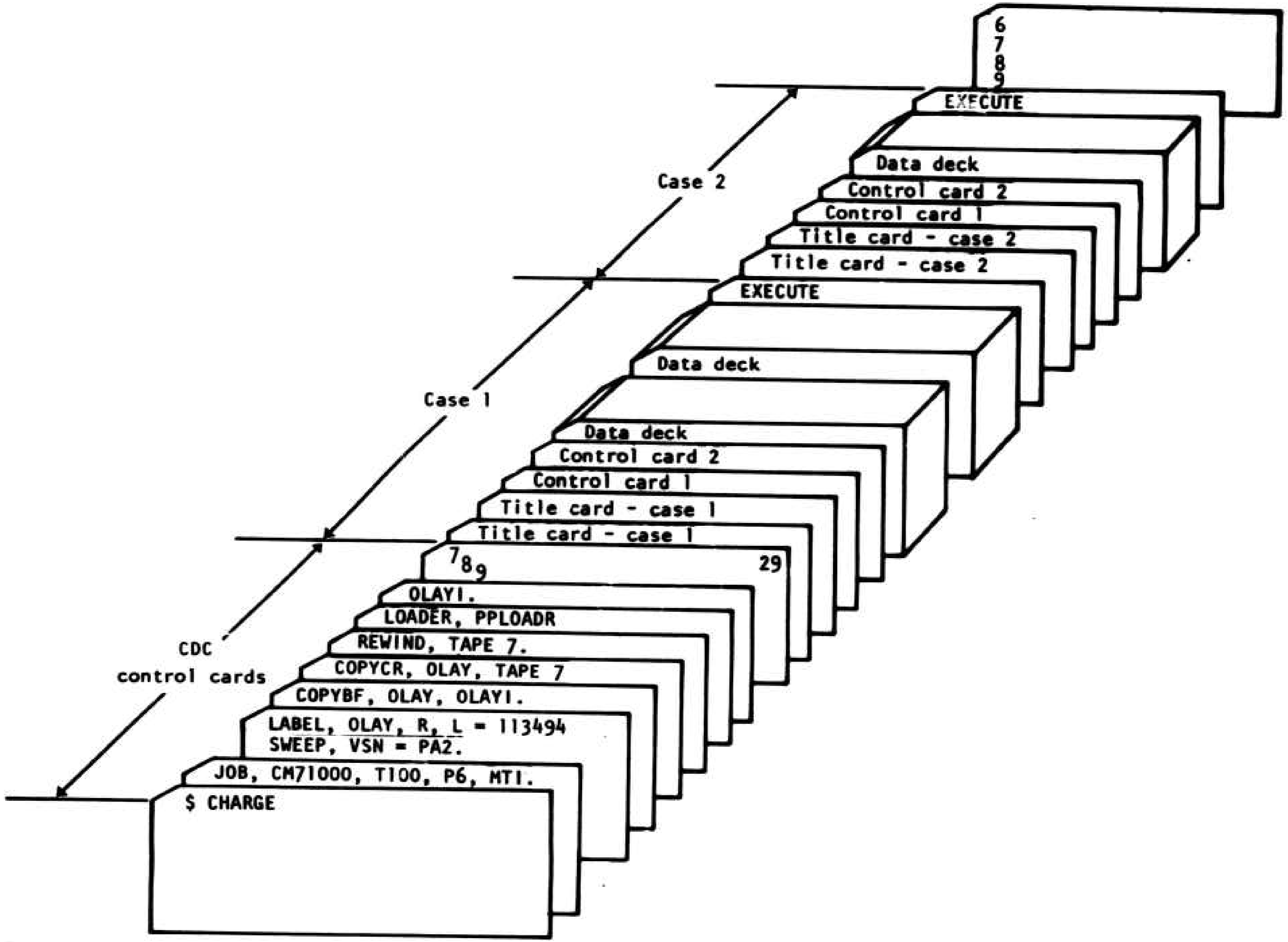


Figure 3. SWEEP program sample input data deck arrangement.

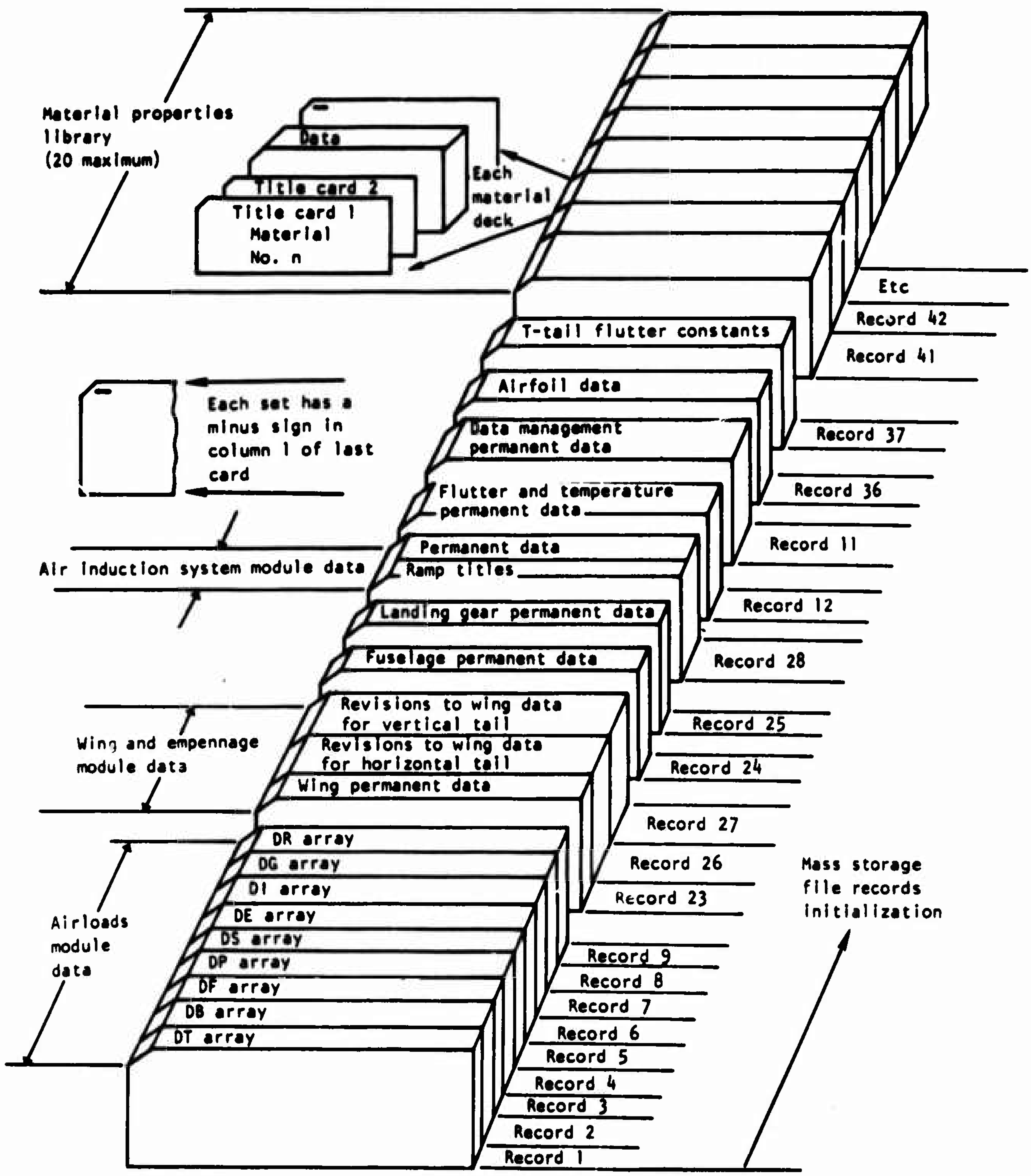


Figure 4. SWEEP permanent data bank data deck setup and mass storage file initialization.

TABLE 4. PERMANENT DATA BANK DATA DESCRIPTIONS

Array Name and Size	Record No.	Description
DT(56)	1	Aerodynamic data (refer to Vol III)
DB(853)	2	Subsonic aerodynamic data (refer to Vol III)
DF(146)	3	Deflected flap data (refer to Vol III)
DP(734)	4	Supersonic aerodynamic data (refer to Vol III)
DS(288)	5	Blocked mission segment data (refer to Vol III)
DE(340)	6	Maneuver load factor spectra data (refer to Vol III)
DI(60)	7	Taxi load factor spectra data (refer to Vol III)
DG(72)	8	Turbulence field parameters (refer to Vol III)
DR(109)	9	Gust response factors (refer to Vol III)
D(2060)	23	Wing design data (refer to Vol VI)
D(2060)	26	Horizontal tail design data (refer to Vol VI)
D(2060)	27	Vertical tail design data (refer to Vol VI)
D(2000)	24	Fuselage design data (refer to Vol VII)
D(116)	25	Landing gear design data (refer to Vol V)
D(2000)	28	Air induction system, nacelle, and engine section design data (refer to Vol V)
DATA(312)	12	Flutter and temperature data (refer to Vol IV)
D(1606)	11	Design data for data management module (refer to Vol II)
DAF(500)	36	Airfoil data (refer to Vol VI)
GJDAT(100)	37	T-tail flutter constants (refer to Vol VI)
TMD(300)	41-60	Material properties data (refer to Vol IV)

CASE DATA CARD DECK

The first two cards in the input data deck for each case are title cards. 80 alphanumeric characters may be written on each card.

Control card 1 follows the two title cards. This card contains the optional output print indicators. These indicators are shown in Table 5.

Control card 2 follows control card 1. This card contains the airloads module indicators in columns 1 through 38, wing and empennage construction indicators in columns 39 through 44, program flow controls in columns 71 through 79, and an initialization indicator in column 80. Descriptions of these controls and indicators are shown in Table 6.

Data decks follows control card 2. The first card in each data deck must contain one of the identification titles shown in the following in columns 1 through 10. Columns 11 through 80 are not read by the program, and therefore may be used for deck identification or comments by the program user.

1 2 3 4 5 6 7 8 9 10
G E N E R A L
W I N G
H O R I Z O N T A L
V E R T I C A L
F U S E L A G E
L G
A I S
F A T I G U E
W H V L O A D S
F U S L O A D S
I N E R T I A

The remaining cards contain numeric data which are read and processed based on a relative address for the field data on each card (Figure 5). The last card of each data deck has a minus sign (-) punched in card column 1. Usage matrix of these data checks is shown in Table 7. Detail discussions of variables in these decks are presented in Volumne IV, Users' Manual.

The last card in the case data deck has "EXECUTE" punched in columns 1 through 7. Columns 8 through 10 on this card must be left blank.

TABLE 5. CASE CONTROL CARD 1 - PRINT INDICATORS

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
1	READ	(1,0)	Permanent data, first case only
2	READ	(1,0)	Case data
3	CCNTL	(8,0)	WD array, some of D-array before data transfer, total D-array, SPAL array (record 38)
4	GEOMC	(8,0)	YC, YTC, and TAF arrays
5	DMAX	(8,0)	Values from YTC, YC, and TAF arrays
	ABOXC	(8,0)	Values from YTC and TT arrays
	TBWDC	(8,0)	Title for DMAX print
6	PRTG(GEOMW)	(8,0)	Detail geometry
7	GEOMW	(8,0)	TCJ array
	PRTG	(8,0)	TXY array - only when IP(6) also = 0
	VSGEOM	(8,0)	TVS array
8	CTOT1	(14,0)	TT(1), TT(2), and YC array
	GCNTL	(14,0)	Title for CTOT1 print
	LEWT	(14,0)	Title for CTOT1 print
	TEDEV	(14,0)	Title for CTOT1 print
	TEWT	(14,0)	Title for CTOT1 print
	TEWTI	(14,0)	Title for CTOT1 print
9	GCNTL	(14,0)	TG and TGA arrays
10	LETEI	(14,0)	TCS, TWG, CLEI, and CTEI arrays
11	LEWT	(14,0)	TGR, TST, CCI, CCL, and CCW arrays
	TEWT	(14,0)	CCW, CCT, and TE arrays
	TEWTI	(14,0)	TGR, TST and CCI arrays
12	WLETE	(14,0)	Leading and trail edge weight and loads summary
13	MISCNT	(15,0)	Detail - CCI, TST, and TGR arrays
	PRTM(MISCIT)	(15,0)	Detail - CCI, TST, TGR, and TCS arrays
14	MISCNT	(15,0)	Summary - CMII and TMVT arrays
	PRTM(MISCIT)	(15,0)	Summary - TCS and CCI arrays

TABLE 5. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
15	CTOT2	(15,0)	TT(1), TT(2), and YC array
	MISCNT	(15,0)	Title for CTOT2 print
	MISCIT	(15,0)	Title for CTOT2 print
	CDL	(15,0)	Title for CTOT2 print
	FDIS	(15,0)	Title for CTOT2 print
16	CDL	(15,0)	TGR and TCS arrays
	TBFWI1	(15,0)	CCI and TCS arrays
17	FDIS	(15,0)	CCI, TST, TCS, TWG, and TVMT arrays
18	FDIS	(15.0)	Fuel distribution summary
19	MTLPW(MTLCW)	(16,0)	Torque box and pivot material properties
	TEMPC	(18,0)	Material properties for advanced composites
20	ALOAD	(16,0)	Limit airloads and scaling ratios
	ACLOAD	(18,0)	ACL array
21	ABDW	(16,0)	Initial deadweight distribution
22	GJCAL	(16,0)	Flutter analysis values, GJ and J comparison Design GJ values
	GJTT	(16,0)	T-tail GJ values
23	WDDATA	(16,0)	T and CD arrays
24	VLOAD1	(16,0)	Initial design loads, required GJ
	DEADW	(9,0)	Deadweight summary and adjustment results, for NODW > 1
	DWYBA	(9,0)	Deadweight and Y-bar adjustment values, for NODW > 1
	VLOAD	(9,0)	Design loads and required GJ, for NODW > 1
	DEADW	(18,0)	Deadweight summary and adjustment results, for NODW > 1
	DWYBA	(18,0)	Deadweight and Y-bar adjustment values, for NODW > 1
	AVLOAD	(18,0)	Design loads, required GJ, loads at each condition

TABLE 5. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
25	DEADW	(9,0)	Deadweight summary and adjustment results, for NODW=1
	DWYBA	(9,0)	Deadweight and Y-bar adjustment values, for NODW=1
	VLOAD	(9,0)	Design loads and required GJ, for NODW=1
	DEADW	(18,0)	Deadweight summary and adjustment results, for NODW=1
	DWYBA	(18,0)	Deadweight and Y-bar adjustment values, for NODW=1
	AVLOAD	(18,0)	Design loads, required GJ, loads at each condition, for NODW=1
26	DLPVT	(9,0)	TW array
	PIVOT	(9,0)	Pivot values
	DLPVT	(18,0)	TW array
	PIVOT	(18,0)	Pivot values
27	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=2
	ACPRTA (ATBOPT)	(18,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=2
28	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=1,3
	ACPRTA (ATBOPT)	18,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=1,3
29	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW=1 and DGW=2
	PRTH(TBOPT)	(9,0)	Pivot and center section analysis values, for NODW=1 and DGW=2
	ACPRTA (ATBOPT)	(18,0)	Design synthesis and weight distribution summary for NODW=1 and DGW=1,2,3
	PRTH(ATBOPT)	(18,0)	Pivot and center section analysis values, for NODW=1 and DGW=1,2,3
30	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW=1 and DGW=1,3
	PRTH(TBOPT)	(9,0)	Pivot and center section analysis values, for NODW=1 and DGW=1,3

TABLE 5. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
31	PRTB(CNSTR)	(10,0)	Synthesis details, for DGW=2
	PRTC(CNSTR)	(10,0)	Weight analysis details, for DGW=2
	PRTB(ACNSTR)	(18,0)	Synthesis details, for DGW=2
	PRTC(ACNSTR)	(18,0)	Weight analysis details, for DGW=2
	ACNSTR	(18,0)	DDUC, DDLC, DDIS, DDFS, DDRS, and DDSTR arrays, for DGW=2
	ASTIFF	(18,0)	CD array, for DGW=2
32	PRTB(CNSTR)	(10,0)	Synthesis details, for DGW=1,3
	PRTC(CNSTR)	(10,0)	Weight analysis details, for DGW=1,3
	PRTB(ACNSTR)	(18,0)	Synthesis details, for DGW=1,3
	PRTC(ACNSTR)	(18,0)	Weight analysis details, for DGW=1,3
	ACNSTR	(18,0)	DDUC, DDLC, DDIS, DDFS, DDRS, and DDSTR arrays, for DGW=1,3
	ASTIFF	(18,0)	CD array, for DGW=1,3
33	PRTBK(STRG)	(10,0)	Checkout print, requires data indicators
	PRTBK(TSCH)	(10,0)	Checkout print, requires data indicators
34	WVFDD	(17,0)	TCS and CCDLI arrays
	TBFWI	(17,0)	TCS and CCI arrays
35	CTOT	(17,0)	TT(1), TT(2), and YC array
	WVFDD	(17,0)	Title for CTOT print
	WFLDD	(17,0)	Title for CTOT print
36	WODATA	(17,0)	Surface inertia summary
37	PRTD	(17,0)	Detail weight and coefficient summaries
38	WODATA	(17,0)	WCG, CTBW, CTBI, CLEI, CTEI, CMII, CFL1I, CFL2I, CCDLI, CIOY, and CCI arrays
39	not used		
40	OLAY00	(0,0)	Case title and module identification
41	WHVMAT	(3,0)	Stress vs temperature tables
	WHVQQ	(3,0)	Compressible dynamics pressure values
	SVFTAB	(3,0)	Flutter parameter vs mach number
42	SPDALT	(2,0)	Speed-altitude profile tables
43	DSGNPR	(2,0)	Speed profile design factors

TABLE 5. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
44	QUIKIE	(2,0)	S-array
45	AVDINR	(2,0)	RT, RW, RH, RV, RA, and RO arrays
46	PRTOWE (DATAIN)	(2,0)	Weight empty breakdown, expendable useful load
47	DATAIN	(2,0)	BC array
	DMAXLD	(2,0)	Estimated shear, bending moment, and torque
	DCCNTL	(2,0)	WD array
48	AVDATA	(2,0)	S-array
49	DATAIN	(2,0)	Common at end of Data Management
50	BNLDS	(4,0)	Body loads
51	SPABM	(4,0)	Shear, bending moment, and torsion moment
52	USPAN	(4,0)	Airload distribution factors
53	WHVNET	(4,0)	Design loads and ratios
54	BLCNTL	(4,0)	Temperature and stress for 23 load conditions, design temperature and load conditions, maximum net bending moments for fatigue
55	FATMG	(4,0)	Fatigue spectra
56	FATGUE	(5,0)	Bending moment spectra input
57	FATIGU	(5,0)	Damage table, calc life, etc
	FTGCTL	(5,0)	"FATIGUE " input values
58	FATIGU	(5,0)	Intermediate values, iteration trace
59	LANDGR	(6,0)	Landing gear input data
60	LGEAR	(6,0)	Landing gear loads
61	AISMN	(7,0)	AIS system input data
62	SPAL	(7,0)	Speed-altitude profile tables
63	MATLP2 (MCNTL1)	(7,0)	Duct, ramp and nacelle material properties

TABLE 5. CASE CONTROL CARD 1 - PRINT INDICATORS (CONCL)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
64	MCNTL1	(7,0)	TMS array
65	DSGNP	(7,0)	Speed profile design factors
66	PRECRT	(7,0)	Ramp design conditions
67	RAMPS	(7,0)	Built-in parameters, reaction forces and weights
68	FRMELD	(7,0)	Duct frame data
69	DUCTS	(7,0)	Duct frame data and duct geometry - section data
70	NACELE	(7,0)	Nacelle geometry - section data
71	FUSLD	(11,0)	Fuselage loads and inertia data
72	MATLP1 (MFCNTL)	(11,0)	Cover, longeron, major and minor frames material properties
73	MFCNTL	(11,0)	TMS array
74	FUSLD DUMMY1	(11,0) (11,0)	Loads array Input and corrected data
75	FFRME FRMND1	(11,0) (11,0)	External frame loads details Fuselage shape details
76	SFOAWE FRMLD	(11,0) (11,0)	Frame synthesis details Segment loads details
77	FFRME	(11,0)	Major frames detail weights
78	MINFR	(12,0)	T-array
79	FUSSHL	(12,0)	T-array
80	SPRINT	(12,0)	Details - Construction indicators, basic vehicle data, secondary structure, shell and section values

[a]Routine in which the corresponding IP element is tested and printing is done. If a second routine name appears in parenthesis as PRTG(GEOMW), this indicates that PRTG is strictly a print routine and the indicator is used in GEOMW to call or not call PRTG.

TABLE 6. CASE CONTROL CARD 2 INDICATORS

Control Card 2 Column	Labeled Common Location	Description
1-2	XMISC(51)	Air vehicle class indicator 01 = fighter (F) 02 = attack (A) 03 = tactical bomber (BI) 04 = strategic bomber (BII) 05 = cargo assault (CA) 06 = cargo transport (CT)
3-4	XMISC(52)	Wing-type indicator -1 = fixed wing 01 = variable-sweep wing
5-6	XMISC(53)	Vertical tail-type indicator -1 = single tail 00 = dual tail 01 = T-type tail
7-8	XMISC(54)	Load calculation option indicator -1 = calculate basic loads only 00 = calculate fatigue spectra only 01 = calculate both basic loads and fatigue spectra
9-10	XMISC(55)	Total vehicle load calculation control 01 = compute all loads (fuselage, wing, horizontal tail, vertical tail) 00 = compute loads as indicated by controls in columns 11 through 18
11-12	XMISC(56)	Fuselage load calculation indicator 01 = compute 00 = do not compute
13-14	XMISC(57)	Wing load calculation indicator 01 = compute 00 = do not compute
15-16	XMISC(58)	Horizontal tail load calculation indicator 01 = compute 00 = do not compute

TABLE 6. CASE CONTROL CARD 2 INDICATORS (CONT)

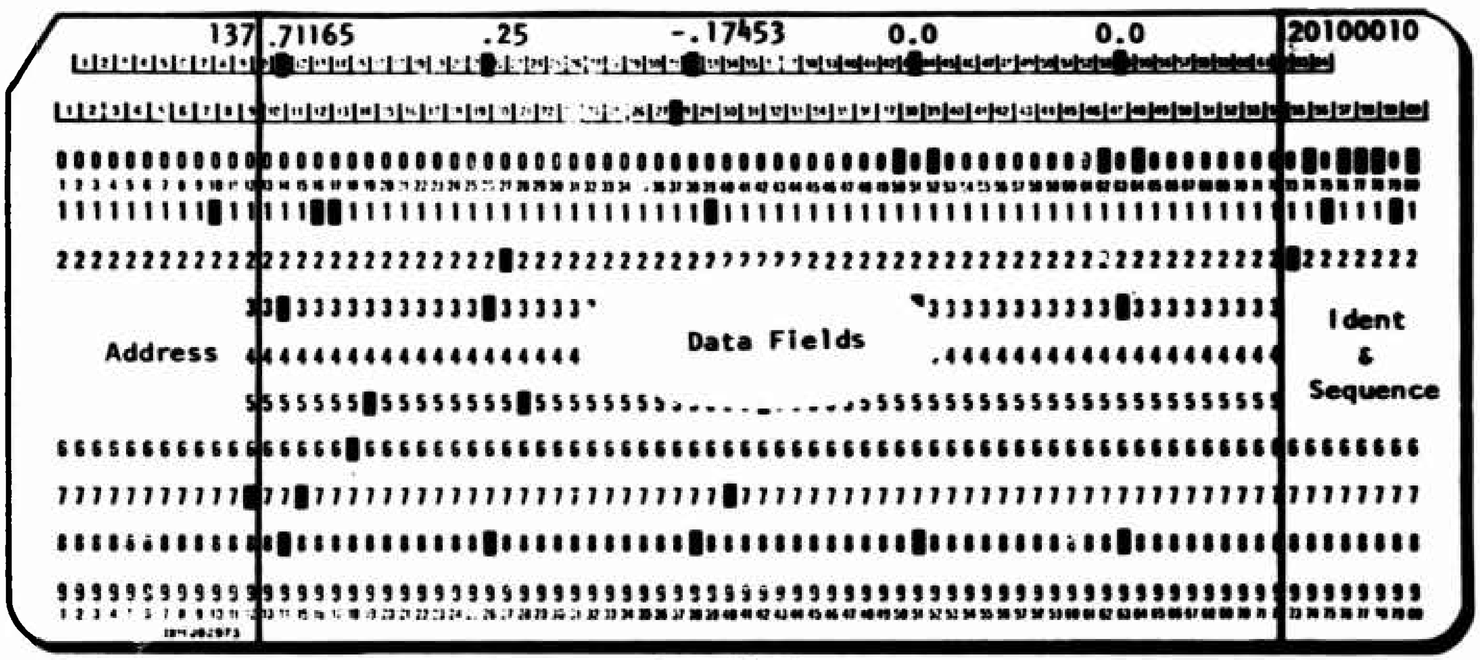
Control Card 2 Column	Labeled Common Location	Description
17-18	XMISC(59)	Vertical tail load calculation indicator 01 = compute 00 = do not compute
19-20	XMISC(60)	Load conditions 1 through 5 calculation indicator (positive maneuver conditions) 01 = compute 00 = do not compute
21-22	XMISC(61)	Load conditions 6 and 7 calculation indicator (negative maneuver conditions) 01 = compute 00 = do not compute
23-24	XMISC(62)	Load condition 8 calculation indicator (flaps down, maneuver condition) 01 = compute 00 = do not compute
25-26	XMISC(63)	Load condition 9 calculation indicator (flaps down, landing) 01 = compute 00 = do not compute
27-28	XMISC(64)	Load conditions 10 through 13 calculation indicator (positive vertical gust conditions) 01 = compute 00 = do not compute
29-30	XMISC(65)	Load conditions 14 through 17 calculation indicator (negative vertical gust conditions) 01 = compute 00 = do not compute
31-32	XMISC(66)	Load conditions 18 and 19 calculation indicator (lateral gust conditions) 01 = compute 00 = do not compute

TABLE 6. CASE CONTROL CARD 2 INDICATORS (CONT)

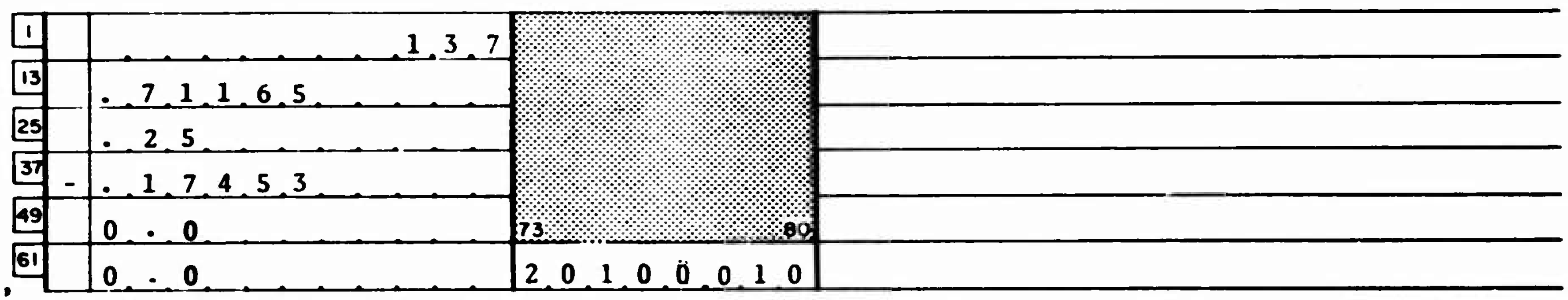
Control Card 2 Column	Labeled Common Location	Description
33-34	XMISC(67)	Load conditions 20 and 21 calculation indicator (pitching acceleration conditions) 01 = compute 00 = do not compute
35-36	XMISC(68)	Load conditions 21 and 23 calculation indicator (yawing acceleration conditions) 01 = compute 00 = do not compute
37-38	XMISC(69)	Wing fatigue spectra calculation indicator -1 = compute gust and maneuver spectra 01 = compute gust spectra only
39-40	IFL(11)	Wing construction indicator 00 = metal structure 01 = advanced composite structure
41-42	IFL(12)	Horizontal tail construction indicator 00 = metal structure 01 = advanced composite structure
43-44	IFL(13)	Vertical tail construction indicator 00 = metal structure 01 = advanced composite structure
45-70		Not used
71	IFL(1)	Airloads module execution control 0 = execute 1 = do not execute
72	IFL(2)	Wing execution control for wing and empennage module 0 = execute 1 = do not execute
73	IFL(3)	Fuselage module execution control 0 = execute 1 = do not execute

TABLE 6. CASE CONTROL CARD 2 INDICATORS (CONCL)

Control Card 2 Column	Labeled Common Location	Description
74	IFL(4)	Landing gear module execution control 0 = execute 1 = do not execute
75	IFL(5)	Horizontal tail execution control for wing and empennage module 0 = execute 1 = do not execute
76	IFL(6)	Vertical tail execution control for wing and empennage module 0 = execute 1 = do not execute
77	IFL(7)	Air induction system module execution control 0 = execute 1 = do not execute
78	IFL(8)	Fatigue module execution control 0 = execute 1 = do not execute
79	IFL(9)	Final output module execution control 0 = execute 1 = do not execute
80	IFL(10)	File initialization control for subsequent cases (not applicable for first case) 0 = leave files as they exist and update with input data 1 = reinitialize data files (mass storage file records 1-9, 11, 12, 17, 21, 23-29, 32-34, 36-38, and 41-60) from TAPE7



Data Card



Data Sheet

Figure 5. Relative read data card format.

TABLE 7. USAGE MATRIX OF INPUT DATA DECKS

Data Deck Title	Mass Storage File Record	Module	Component	Description
GENERAL	11	Data management	Vehicle	Vehicle geometry and design data
	24[a]	Fuselage	Fuselage	Fuselage geometry
	28[a]	Air induction system	Nacelles, ducts, and engine section	Nacelle, ducts, and engine section design data
	5	Airloads	Vehicle	Blocked mission segments
WING	23	Wing and empennage	Wing	Wing design data
HORIZONTAL	26	Wing and empennage	Horizontal tail	Horizontal tail design data
VERTICAL	27	Wing and empennage	Vertical tail	Vertical tail design data
FUSELAGE	24[a]	Fuselage	Fuselage	Fuselage design data
LG	25	Landing gear	Landing Gear	Landing gear design data
AIS	28[a]	Air induction system	Nacelles, ducts, and engine section	Nacelle, ducts, and engine section design data
FATIGUE	29	Fatigue	Wing and fuselage	Fatigue design data
	35	Fatigue	Wing	Wing bending moment spectra
WHV LOADS	32	Wing and empennage	Wing, horizontal tail, and vertical tail	Surface loads data

TABLE 7. USAGE MATRIX OF INPUT DATA DECKS (CONCL)

Data Deck Title	Mass Storage File Record	Module	Component	Description
FUS LOADS	33	Fuselage	Fuselage	Vehicle airload, center-of-pressure, and inertia factor data
INERTIA	34	Fuselage	Fuselage	Vehicle and component weight distributions and speed-altitude profile data

[a]Some of the data in the "GENERAL" data deck duplicate data required in the "FUSELAGE" and "AIS" data decks. The values in the "GENERAL" data deck are transfered to the fuselage and AIS data file records whenever the general data are read.

OPERATING CONSIDERATIONS

Problem definition and program controls require coordination between case control card 2 instructions and design data decks. The SWEEP main control program starts by calling the input data processing module. Program execution requirements through the design data development, weight analysis, and output module are shown in Table 8. This table presents minimum and optional execution requirements which can be employed for the range of problem modes. Definition of all user input variables is presented in Volume IX, User's Manual.

INITIALIZATION AND COMPUTATION

The SWEEP control program controls the execution of the problem. It occupies the main level of the overlay system and monitors the logic flow through initialization of data, design data development, weight analysis, and output.

INPUT DATA PROCESSING

The input data processing module organizes the data bank data and input variable design data in mass storage file records at the start of each problem case. A complete list of SWEEP mass storage file records is shown in Table 9. Computational flow instructions from case control cards 1 and 2 and certain key variables from the input design data are stored in labeled common locations. Labeled common block IFLOW indicators are shown in Table 10. Program definition and usage of the labeled common block MISC are shown in Table 11.

DESIGN DATA DEVELOPMENT

The design data development modules interpret input vehicle design specifications and geometry data and compute detail design data for use in evaluating the structural components. Modules programmed for design data development are:

1. Data management module, overlay (2,0)

2. Flutter and temperature module, overlay (3,0)

3. Airloads module, overlay (4,0)

4. Fatigue module, overlay (5,0)

TABLE 8. LOGIC AND DATA REQUIREMENTS FOR EXECUTION OF SWEEP MODULES

Module	Indicator and Reqd Data Deck: Control Card 2 Column	Indicator and Reqd Data Deck: Data Deck	Discussion
Data management	None	GENERAL	Data management and flutter and temperature modules are executed in each case in which "GENERAL" is read
Flutter and temperature	None	GENERAL	This module uses speed-altitude profile and geometry data from the data management module
Airloads	71	GENERAL	This module requires data from the data management module from the same case or a previous case. Detail execution controls are in control card 2 columns 1 through 38.
Fatigue	78	FATIGUE	This module may be executed as a stand-alone program or with spectrum data created by the airloads module.
Landing gear	74	LG	This module may be executed as a stand-alone program or with design data from the data management module.
Air induction system	77	AIS	This module may be executed as a stand-alone program. If "GENERAL" data are part of the input case data, certain variables are transferred to the "AIS" data record.

TABLE 8. LOGIC AND DATA REQUIREMENTS FOR EXECUTION OF SWEEP MODULES (CONCL)

Module	Indicator and Reqd Data Deck		Discussion
	Control Card 2 Column	Data Deck	
Wing and empennage (wing)	39-40, 72	WING	This module may be executed as a stand-alone program. Loads may be defined either in the "WING" deck, the "WHV LOADS" deck, or by the airloads module. Flutter data may be defined in the "WING" deck or obtained from the flutter and temperature module.
Wing and empennage (horizontal tail)	41-42, 75	HORIZONTAL	Refer to wing discussion.
Wing and empennage (vertical tail)	43-44, 76	VERTICAL	Refer to wing discussion
Fuselage	73	FUSELAGE	This module may be executed as a stand-alone program. If "GENERAL" data are part of the input case data, certain variables are transferred to the "FUSELAGE" data record. Inertia and loads data may be obtained through execution of the data management, flutter and temperature, and airloads module or by input of the "INERTIA" and "FUS LOADS" decks.
Final output	79	GENERAL	This module requires data from the data management module from the same case or a previous case

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
1	D(56)	READ	(1,0)	TAPE7	DT(56)	BLCNTL	(4,0)	Permanent file aerodynamic data
2	D(853)	READ	(1,0)	TAPE7	DB(853)	BLCNTL	(4,0)	Permanent file subsonic aero data
3	D(146)	READ	(1,0)	TAPE7	DF(146)	BLCNTL	(4,0)	Permanent file deflected flap data
4	D(734)	READ	(1,0)	TAPE7	DP(734)	BLCNTL	(4,0)	Permanent file supersonic aero data
5	D(288)	READ	(1,0)	TAPE7 and "GENERAL"	D(288) DS(288)	READ FATMG	(1,0) (4,0)	Permanent file or input blocked mission segment tables
6	D(340)	READ	(1,0)	TAPE7	DE(340)	FATMG	(4,0)	Permanent file maneuver load factor spectra
7	D(60)	READ	(1,0)	TAPE7	DI(60)	FATMG	(4,0)	Permanent file taxi load factor spectra
8	D(72)	READ	(1,0)	TAPE7	DG(72)	FATMG	(4,0)	Permanent file turbulence field parameter
9	D(109)	READ	(1,0)	TAPE7	DR(109)	FATMG	(4,0)	Permanent file gust response factors

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
10	TGJ(200)	GEOMW	(8,0)	Calculated	TGJ(200)	GJCAL	(16,0)	Geometry and design data for flutter requirement calculations
11	D(1606)	READ	(1,0)	TAPE7 and "GENERAL"	D(1606) D(1400) D(1400)	READ DATAIN OUTPUT	(1,0) (2,0) (13,0)	Input data set for data management module
12	D(312)	READ	(1,0)	TAPE7	DATA (312)	OLAY3	(3,0)	Permanent file flutter and temperature data
13	CD(400)	ACPROG	(18,0)	Calculated				Calculated torque-box stiffness data, gross weight 1
14	CD(400)	ACPROG	(18,0)	Calculated	CD(1401-1800)	WVFDD	(17,0)	Calculated torque-box stiffness data, gross weight 2
15	CD(400)	ACPROG	(18,0)	Calculated				Calculated torque-box stiffness data, gross weight 3
16								Not used

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
17	RATIO (264) RATIO (264)	READ WHVNET	(1,0) (4,0)	Initial-ized to 1.0 Calculated	RATIO (264) RATIO (264)	WHVNET ALOAD	(4,0) (16,0)	Load factor, temperature, and content normalizing factors
18	WLD(300)	DMAXLD	(2,0)	Calculated	WLD(300)	BLCNTL	(4,0)	Wing and empennage inertia loads per unit load factor and wing net taxi loads data
19	DV(2320)	DATAIN	(2,0)	Calculated	DV(2320)	OUTPUT	(13,0)	Calculated variables from data management module
20								Not used
21	D(200) WD(200)	READ DCCNTL	(1,0) (2,0)	Initial-ized to 0.0 Calculated	WD(200) WD(200)	MAXLDS CCNTL	(4,0) (8,0)	Wing and empennage geometry and design data
22	BC(195)	DATAIN	(2,0)	Calculated	BC(195) BC(195) BC(168)	OLAY3 BLCNTL WFLDD	(3,0) (4,0) (17,0)	Vehicle geometry and design data
23	D(2060)	READ	(1,0)	TAPE7 and "WING"	D(2060) D(2060)	READ CCNTL	(1,0) (8,0)	Input wing design data

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
24	D(2000)	READ	(1,0)	TAPE7, "GENERAL," and "FUSELAGE"	D(2000) D(2000)	READ FUS01	(1,0) (11,0)	Input fuselage design data
25	D(116) D(116)	READ DLNDGR	(1,0) (2,0)	TAPE7 and "LG" Calculated	D(116) D(116) D(116)	READ DLNDGR LANDGR	(1,0) (2,0) (6,0)	Input landing gear design data
26	D(2060)	READ	(1,0)	TAPE7 and "HORIZONTAL"	D(2060) D(2060)	READ CCNTL	(1,0) (8,0)	Input horizontal tail design data
27	D(2060)	READ	(1,0)	TAPE7 and "VERTICAL"	D(2060) D(2060)	READ CCNTL	(1,0) (8,0)	Input vertical tail design data
28	D(2000)	READ	(1,0)	TAPE7, "AIS," and "GENERAL"	D(2000) D(2000)	READ AISMN	(1,0) (7,0)	Input air induction system and engine section design data

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
29	D(2400)	READ	(1,0)	Initialized to 0.0., replaced by "FATIGUE"	D(2400) D(2400)	READ FATGUE	(1,0) (5,0)	Input fatigue design data
30	ACL(900)	ACLOAD	(18,0)	Calculated	ACL(900)	AVLOAD	(18,0)	Design loads and loading condition data, advanced composite option
31	SVF(180)	OLAY3	(3,0)	Calculated	SVF(180)	BLCNTL	(4,0)	Ambient condition, temperature, and structural component material property data
32	D(198)	READ	(1,0)	Initialized to 0.0, replaced by "WHV LOADS"	D(198) DUM(198)	READ WHVNET	(1,0) (4,0)	Design airloads shear, moment, and torque data for wing and empennage
	DUM(198)	WHVNET	(4,0)	Calculated	SLD(198)	ALOAD	(16,0)	

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
33	D(672) FUS(672)	READ FUSNET	(1,0) (4,0)	Initial-ized to 0.0, replaced by "FUS LOADS" Calculated	D(672) FUS(672)	READ FUSLD	(1,0) (11,0)	Vehicle airloads, centers of pressure, and inertia factors
34	D(480) FUSDWI (480)	READ AVDINR	(1,0) (2,0)	Initial-ized to 0.0 replaced by "INERTIA" Calculated	D(480) FUSDWI (480)	READ FUSLD	(1,0) (11,0)	Vehicle and component weight, center of gravity, and pitch and yaw inertia and limit flight profile
35	DUMMY (830) DUMMY (830)	READ FATMG	(1,0) (4,0)	"FATIGUE" Calculated	DUMMY (830)	FATGUE	(5,0)	Wing bending moment spectra data
36	D(500)	READ	(1,0)	TAPE7	DAF(500)	GEOMW	(8,0)	Permanent file airfoil data

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
37	D(100)	READ	(1,0)	TAPE7	GJDAT (100) GJDAT (100)	WHVQQ GJTT	(3,0) (16,0)	Permanent file T-tail flutter data
38	D(50) SPAL(50) SPAL(50) DUMMY (50)	READ DWHVQQ WHVQQ WODATA	(1,0) (2,0) (3,0) (17,0)	Initial-ized to 0.0 Calculated Calculated Calculated	SPAL(50) SPAL(50) T(1001-1050) DUMMY (50)	DWHVQQ WHVQQ CCNTL WODATA	(2,0) (3,0) (8,0) (17,0)	Speed-altitude profile and wing and empennage flutter design data
39	RLDS (132)	ACPROG	(18,0)	Calculated	RLDS (132)	ACPROG	(18,0)	Scratch storage and normalizing factors, advanced composite option
40	CD(400)	ACNSTR	(18,0)	Calculated	CD(400) CD(400)	ACPRTA ATBOPT	(18,0) (18,0)	Scratch storage and torque-box stiffness data, advanced composite option

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
41-60	TMF(300) TMD(300)	READ FTGCTL	(1,0) (5,0)	TAPE7 Calculated	TM(300) TMD(300) TMD(300) TMD(300) TMD(300)	WHVMAT FTGCTL MCNTL1 MTLCW MFCNTL	(3,0) (5,0) (7,0) (16,0) (11,0)	Permanent file material property data
61-84	S6(200)	FUSLD	(11,0)	Calculated	S6(200) S6(200)	FFRME LDCHK	(11,0) (12,0)	Fuselage net design loads data for each of 24 load conditions
85-100	TMS(120)	MFCNTL	(11,0)	Calculated	TMS(120) TMS(120)	SFOAWE LDCHK	(11,0) (12,0)	Fuselage structural component material property data for each of 24 load conditions
109-117	TMS(180)	MCNTL1	(7,0)	Calculated	TMS(180) TMS(180)	PYLONS NACELE PRECRT	(7,0) (7,0) (7,0)	Nacelle and duct material property data at each of 9 flight profile points
118	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque box optimization point 1
119	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque box optimization point 1
120	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque box optimization point 1

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
121	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 1
122	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 1
123	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 2
124	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 2
125	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 2
126	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 2
127	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 2
128	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 3
129	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 3

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
130	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 3
131	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 3
132	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque box optimization point 3
133	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 4
134	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 4
135	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 4
136	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 4
137	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 4
138	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 5

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
139	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 5
140	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 5
141	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 5
142	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 5
143	TSC(200)	PROG	(9,0)	Calculated	TSC(200)	PROG	(9,0)	Scratch design data, gross weight change
144	YC(200)	CASE	(8,0)	Calculated	TG(200)	WODATA	(17,0)	Geometry data, aero and structural chord calculation
145	TGA(135)	WCONT	(15,0)	Calculated	TGA(135)	WODATA	(17,0)	Geometry data, mass distribution calculations
146	TG(300)	WCONT	(15,0)	Calculated	TG(300)	WODATA	(17,0)	Geometry data, mass distribution calculations
147	TGW(400)	WCONT	(15,0)	Calculated	TGW(400)	WODATA	(17,0)	Weight distribution and inertia loads data

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
148	CCW(50)	WCONT	(15,0)	Calculated	CCW(50)	WODATA	(17,0)	Weight summary data, leading and trailing edge structures
149	CLEI (150)	WLETE	(14,0)	Calculated	CLEI (150) CLEI (150)	WODATA WDDATA	(17,0) (16,0)	Calculated mass distribution data, leading edge structures
150	CTEI (150)	WLETE	(14,0)	Calculated	CTEI (150) CTEI (150)	WODATA WDDATA	(17,0) (16,0)	Calculated mass distribution data, trailing edge structures
151	CFL1I (150)	WCONT	(15,0)	Calculated	CFL1I (150)	WODATA	(17,0)	Calculated mass distribution data, fuel cell 1
152	CFL2I (150)	WCONT	(15,0)	Calculated	CFL2I (150)	WODATA	(17,0)	Calculated mass distribution data, fuel cell 2
153	CMII (150)	WCONT	(15,0)	Calculated	CMII (150)	WODATA	(17,0)	Calculated mass distribution data, miscellaneous contents and structures
154	CCDLI (150)	WCONT	(15,0)	Calculated	CCDLI (150)	WODATA	(17,0)	Calculated mass distribution data, concentrated mass items
155	TCS(150)	WODATA	(17,0)	Calculated	CTBI(150)	WODATA	(17,0)	Calculated mass distribution data, torque-box structures

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
156	CTBW(150) CTBW(150)	PROG ACPROG	(9,0) (18,0)	Calculated Calculated	CTBW(150)	WODATA	(17,0)	Calculated torque-box structure data for mass distribution analysis, gross weight 1
157	CTBW(150) CTBW(150)	PROG ACPROG	(9,0) (18,0)	Calculated Calculated	CTBW(150)	WODATA	(17,0)	Calculated torque box structure data for mass distribution analysis, gross weight 2
158	CTBW(150) CTBW(150)	PROG ACPROG	(9,0) (18,0)	Calculated Calculated	CTBW(150)	WODATA	(17,0)	Calculated torque-box structure data for mass distribution analysis, gross weight 3
159	WHVLID (24)	MAXLDS	(4,0)	Calculated	WHVLID (24)	ACLOAD	(18,0)	Load condition indicators
160-183	BO(200)	MAXLDS	(4,0)	Calculated	WBO(200)	ACLOAD	(18,0)	Wing and empennage airloads shear, bending moment, and torque for load conditions 1 through 24, advanced composite option

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write			Read				Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
184	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(400-499)	WODATA	(17,0)	Weight summary data, wing and empennage exposed panel structures, gross weight 1
185	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(500-599)	WODATA	(17,0)	Weight summary data, wing and empennage exposed panel structures, gross weight 2
186	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(600-699)	WODATA	(17,0)	Weight summary data, wing and empennage exposed panel structures, gross weight 3
187	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(800-899)	WODATA	(17,0)	Weight summary data, pivot and center-section structures, gross weight 1
188	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(900-999)	WODATA	(17,0)	Weight summary data, pivot and center-section structures, gross weight 2

TABLE 9. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONCL)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
189	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(1000- 1099)	WODATA	(17,0)	Weight summary data, pivot and center-section structures, gross weight 3
190	CIOY(150) CCI(150)	WDDATA WODATA	(16,0) (17,0)	Calculated Calculated	CCI(150) CIOY(150)	WODATA WODATA	(17,0) (17,0)	Calculated mass distribution data for yaw inertia
191- 200								Not used

TABLE 10. IFL ARRAY PROGRAM CONTROLS (IFLOW BLOCK)

IFL Loc	Control Card No. 2 Column	Description
1	71	Airloads module execution control 0 = execute 1 = do not execute
2	72	Wing execution control for wing and empennage module 0 = execute 1 = do not execute
3	73	Fuselage module execution control 0 = execute 1 = do not execute
4	74	Landing gear module execution control 0 = execute 1 = do not execute
5	75	Horizontal tail execution control for wing and empennage module 0 = execute 1 = do not execute
6	76	Vertical tail execution control for wing and empennage module 0 = execute 1 = do not execute
7	77	Air induction system module execution control 0 = execute 1 = do not execute
8	78	Fatigue module execution control 0 = execute 1 = do not execute
9	79	Final output module execution control 0 = execute 1 = do not execute
10	80	File initialization control for subsequent cases 0 = leave files as they exist and update with input data 1 = reinitialize data files from TAPE 7

TABLE 10. IFL ARRAY PROGRAM CONTROLS (IFLOW BLOCK) (CONCL)

IFL Loc	Control Card No. 2 Column	Description
11	39-40	Wing construction indicator 00 = metal structure 01 = advanced composite
12	41-42	Horizontal tail construction indicator 00 = metal structure 01 = advanced composite
13	43-44	Vertical tail construction indicator 00 = metal structure 01 = advanced composite

The data management module develops compatible vehicle and structural component geometry data for use by the other design data development modules and the weight analysis modules. This module also provides weight distributions, balance, and inertia required for the evaluation of design loads. Performance requirements are also organized for use by the airloads module. Methods, functions, processes, and description of the data management module are presented in Volume II.

Detail discussions of the flutter and temperature module are presented in Volume IV. This module calculates critical surface flutter design parameters for the wing, horizontal tail, and vertical tail. T-tail flutter is also evaluated for the vertical tail. Structural temperatures are calculated at critical flutter conditions and at the flight load evaluation conditions.

The airloads module develops design airloads and wing bending moment fatigue spectra. Component airloads and centers of pressure are calculated for a number of flight conditions to provide reasonable expectation that the maximum airloads are encompassed. Module methods, formulations, and program description are given in Volume III.

The fatigue module evaluates wing bending moment spectra and fuselage pressure cycle data to determine allowable operating stresses. These allowables are stored in the material property files for use by the wing and fuselage analysis modules. Methods, formulations, and program description are presented in Volume IV.

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK)

Loc	Defined Routine	Defined Overlay	Used Routine	Used Overlay	Description
1	READ	(1,0)	FATGUE AISMN CCNTL MFCNTL	(5,0) (7,0) (8,0) (11,0)	Number of arrays of material properties in mass storage in records 41-60
2	OLAY00	(0,0)	CCNTL ALOAD	(8,0) (16,0)	Component indicator for wing and empennage module 1 = wing 2 = horizontal tail 3 = vertical tail
3	OLAY00 PROG	(0,0) (9,0)	OLAY00	(0,0)	Set to 0.0 in OLAY00; set to 1.0 at end of PROG so that OLAY00 will call OLAY17.
4	OLAY00	(0,0)	READ CCNTL	(1,0) (8,0)	Case number
5	WHVQQ	(3,0)	CCNTL	(8,0)	Dynamic pressure for wing flutter design, lb/ft^2
6	WHVQQ	(3,0)	CCNTL	(8,0)	Dynamic pressure for horizontal tail flutter design, lb/ft^2
7	WHVQQ	(3,0)	CCNTL	(8,0)	Dynamic pressure for vertical tail flutter design, lb/ft^2
8	WHVNET	(4,0)	CCNTL	(8,0)	Wing design (reference) temperature, ° F
9	WHVNET	(4,0)	CCNTL	(8,0)	Horizontal tail design (reference) temperature, ° F
10	WHVNET	(4,0)	CCNTL	(8,0)	Vertical tail design (reference) temperature, ° F
11	OLAY00 READ	(0,0) (1,0)	READ	(1,0)	Case indicator 1.0 = first case 2.0 = subsequent case

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
12	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing aspect ratio (wing fixed or aft)
13	WHVGEO	(2,0)	SVFTAB CCNTL	(3,0) (8,0)	Sweep of wing quarter-chord (wing fixed or aft), deg
14	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing taper ratio (wing fixed or aft)
15	READ	(1,0)	WHVQQ WHVMAT MAXLDS WHVNET FTGCTL	(3,0) (3,0) (4,0) (4,0) (5,0)	Wing material identification number
16	WHVGEO	(2,0)	SVFTAB	(3,0)	Horizontal tail aspect ratio
17	WHVGEO	(2,0)	SVFTAB	(3,0)	Sweep of horizontal tail quarter-chord, deg
18	WHVGEO	(2,0)	SVFTAB	(3,0)	Horizontal tail taper ratio
19	READ	(1,0)	WHVQQ WHVMAT MAXLDS WHVNET	(3,0) (3,0) (4,0) (4,0)	Horizontal tail material identification number
20	WHVGEO	(2,0)	SVFTAB	(3,0)	Vertical tail aspect ratio
21	WHVGEO	(2,0)	SVFTAB	(3,0)	Sweep of vertical tail quarter-chord, deg
22	WHVGEO	(2,0)	SVFTAB	(3,0)	Vertical tail taper ratio
23	READ	(1,0)	WHVQQ WHVMAT MAXLDS WHVNET	(3,0) (3,0) (4,0) (4,0)	Vertical tail material identification number

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined Routine	Defined Overlay	Used Routine	Used Overlay	Description
24	READ	(1,0)	DATAIN	(2,0)	Maximum taxi weight; if not defined, additional landing gear design data are transferred to record 25
25	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing aspect ratio (forward position variable-sweep only)
26	WHVGEO	(2,0)	SVFTAB CCNTL	(3,0) (8,0)	Sweep of wing quarter-chord (forward position variable-sweep only), deg
27	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing taper ratio (forward position variable-sweep only)
28	WHVQQ	(3,0)	CCNTL	(8,0)	Wing structural material shear modulus at design flutter point, $lb/in.^2$
29	WHVQQ	(3,0)	CCNTL	(8,0)	Horizontal tail structural material shear modulus at design flutter point, $lb/in.^2$
30	WHVQQ	(3,0)	CCNTL	(8,0)	Vertical tail structural material shear modulus at design flutter point, $lb/in.^2$
31	READ	(1,0)	FTGCTL	(5,0)	Fuselage cover material identification number
32	BLCNTL	(4,0)	FATGUE	(5,0)	Maximum net unswept wing bending moment at side of fuselage station, in.-lb
33	BLCNTL	(4,0)	FATGUE	(5,0)	Maximum net swept wing bending moment at wing station 2, in.-lb
34	DFATMG	(2,0)	FATGUE	(5,0)	Vehicle service life, hr
35	READ	(1,0)	FUSNET	(4,0)	Vehicle sink speed at landing design weight, ft/sec

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
36	READ	(1,0)	FUSNET	(4,0)	Main landing gear stroke, in.
37	READ	(1,0)	FUSNET	(4,0)	Ratio of ultimate to limit design factor
38	READ	(1,0)	FUSNET	(4,0)	Taxi load factor
39	OLAY00 PROG TBOPT	(0,0) (9,0) (9,0)	PROG TBOPT	(9,0) (9,0)	Wing and empennage module flow control; initialized to 0.0 by OLAY00 at start of module execution.
40	OLAY00 READ	(0,0) (1,0)	OLAY00	(0,0)	Indicator set to 1.0 in OLAY00; set to 0.0 in READ if GENERAL data are input
41	READ	(1,0)	FTGCTL	(5,0)	Fuselage minor frame material identification number
42	WHVNET	(4,0)	VLOAD VLOAD1	(9,0) (16,0)	Indicator to designate that horizontal tail loads have been reversed 0.0 = loads have not been reversed 1.0 = loads have been reversed
43	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at basic flight design weight (wing fixed or aft) at side of fuselage station, in.-lb
44	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at basic flight design weight (wing fixed or aft) at wing station 2, in.-lb
45	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at maximum design weight (wing fixed or fwd) at side of fuselage station, in.-lb

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
46	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at basic flight design weight (wing fwd) at side of fuselage station, in.-lb
47	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at landing design weight(wing fwd) at side of fuselage station, in.-lb
48	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at maximum design weight (wing fwd) at station 2, in.-lb
49	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at basic flight design weight (wing fwd) at station 2, in.-lb
50	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at landing design weight (wing fwd) at station 2, in.-lb
51	READ	(1,0)	BLCNTL	(4,0)	Air vehicle class indicator 1.0 = fighter (F) 2.0 = attack (A) 3.0 = tactical bomber (BI) 4.0 = strategic bomber (BII) 5.0 = cargo assault (CA) 6.0 = cargo transport (CT)
52	READ	(1,0)	BLCNTL	(4,0)	Wing-type indicator -1.0 = fixed wing 1.0 = variable sweep wing
53	READ	(1,0)	DCCNTL WHVQQ BLCNTL	(2,0) (3,0) (4,0)	Vertical-tail-type indicator -1.0 = single tail 0.0 = dual tail 1.0 = T-type tail

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
54	READ	(1,0)	BLCNTL	(4,0)	Load calculation option indicator -1.0 = calculate basic loads only 0.0 = calculate fatigue spectra only 1.0 = calculate both basic loads and fatigue spectra
55	READ	(1,0)	BLCNTL	(4,0)	Total vehicle load calculation control 1.0 = compute all loads (fuselage, wing, horizontal, vertical) 0.0 = compute loads as indicated by controls locations 56 through 59
56	READ	(1,0)	BLCNTL	(4,0)	Fuselage load calculation indicator 1.0 = compute 0.0 = do not compute
57	READ	(1,0)	BLCNTL	(4,0)	Wing load calculation indicator 1.0 = compute 0.0 = do not compute
58	READ	(1,0)	BLCNTL	(4,0)	Horizontal tail load calculation indicator 1.0 = compute 0.0 = do not compute
59	READ	(1,0)	BLCNTL	(4,0)	Vertical tail load calculation indicator 1.0 = compute 0.0 = do not compute
60	READ	(1,0)	BLCNTL	(4,0)	Load conditions 1 through 5 calculation indicator (positive maneuver conditions) 1.0 = compute 0.0 = do not compute

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
61	READ	(1,0)	BLCNTL	(4,0)	Load conditions 6 and 7 calculation indicator (negative maneuver conditions) 1.0 = compute 0.0 = do not compute
62	READ	(1,0)	BLCNTL	(4,0)	Load condition 8 calculation indicator (flap-down maneuver condition) 1.0 = compute 0.0 = do not compute
63	READ	(1,0)	BLCNTL	(4,0)	Load condition 9 calculation indicator (flaps-down landing) 1.0 = compute 0.0 = do not compute
64	READ	(1,0)	BLCNTL	(4,0)	Load conditions 10 through 13 calculation indicator (positive vertical gust conditions) 1.0 = compute 0.0 = do not compute
65	READ	(1,0)	BLCNTL	(4,0)	Load conditions 14 through 17 calculation indicator (negative vertical gust conditions) 1.0 = compute 0.0 = do not compute
66	READ	(1,0)	BLCNTL	(4,0)	Load conditions 18 and 19 calculation indicator (lateral gust conditions) 1.0 = compute 0.0 = do not compute
67	READ	(1,0)	BLCNTL	(4,0)	Load conditions 20 and 21 calculation indicator (pitching acceleration conditions) 1.0 = compute 0.0 = do not compute

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined Routine	Defined Overlay	Used Routine	Used Overlay	Description
68	READ	(1,0)	BLCNTL	(4,0)	Load conditions 22 and 23 calculation indicator (yawing acceleration conditions) 1.0 = compute 0.0 = do not compute
69	READ	(1,0)	BLCNTL	(4,0)	Wing fatigue spectra calculation indicator -1.0 = compute gust and maneuver spectra 1.0 = compute gust spectra only
70	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "GENERAL "
71	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "WING "
72	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "HORIZONTAL"
73	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "VERTICAL "
74	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "FUSELAGE "
75	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "LG "
76	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "AIS "
77	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "FATIGUE "
78	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "WHV LOADS "
79	OLAY00	(0,0)	READ	(1,0)	Input data deck identi[illegible] "FUS LOADS "

TABLE 11. XMISC ARRAY VARIABLES (MISC BLOCK) (CONCL)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
80	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "INERTIA "
81	OLAY00	(0,0)	READ	(1,0)	End of case data identification "EXECUTE "
82	OLAY00	(0,0)			Alphanumeric characters, "WING"
83	OLAY00	(0,0)			Alphanumeric characters, "H.T."
84	OLAY00	(0,0)			Alphanumeric characters, "V.T."
85-100	READ	(1,0)	OLAY00 READ SPDALT DSGNPR AISMN SPAL DSGNP DUCTS NACELE SUMARY CCNTL PRTG PRTA PRTH PRTB PRTC WLETE PRTD ACPRTA PRTB PRTC PRTH	(0,0) (1,0) (2,0) (2,0) (7,0) (7,0) (7,0) (7,0) (7,0) (7,0) (8,0) (8,0) (9,0) (9,0) (10,0) (10,0) (14,0) (17,0) (18,0) (18,0) (18,0) (18,0)	Case title (alphanumeric information on first two cards in the input deck for each case)

STRUCTURAL WEIGHT ESTIMATION

Air vehicle structural component weight analysis modules calculate structural weights for:

1. Wing (refer to Volume VI)

2. Horizontal tail (refer to Volume VI)

3. Vertical tail (refer to Volume VI)

4. Fuselage (refer to Volume VII)

5. Landing gear (refer to Volume V)

6. Nacelles, engine section, and air induction system (refer to Volume V)

Computed weights are derived so that detail weight data are available at the end of the evaluation phase. Modules which evaluate these components may be operated in stand-alone modes or in the integrated mode by using data from the design data development modules.

PROGRAM DEBUGGING

Several levels of printed output are provided from the modules that are executed in the computation process. Summary weight results and error and warning messages are standard program output.

Error and warning messages are printed when data compatibility problems are encountered or when problem definitions are beyond the program limitations. These messages describe the problem, the path taken to circumvent the situation, and the routine which encountered the problem. This allows the completion of downstream computations which may produce unrelated errors.

Other types of program output are controlled through user selection of print indicators. Optional output that can be printed through control card indicators are as follows:

1. Details of weight analysis results

2. Details of structural synthesis results

3. Details of design data and requirements

4. Details of intermediate program calculations